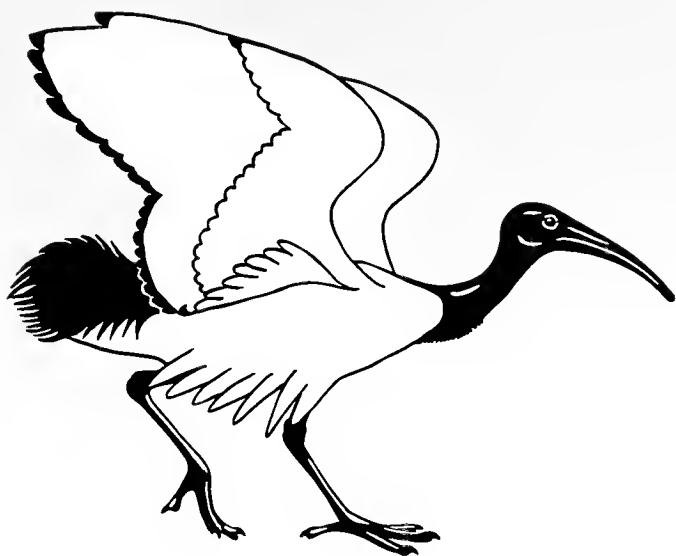
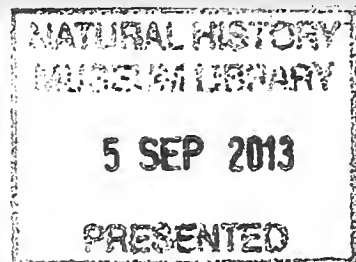


Bulletin of the British Ornithologists' Club



Volume 133 No. 3
September 2013

FORTHCOMING MEETINGS

See also BOC website: <http://www.boc-online.org>

BOC MEETINGS are open to **all**, not just BOC members, **and are free**.

Evening meetings are held in an **upstairs room at The Barley Mow, 104, Horseferry Road, Westminster, London SW1P 2EE**. The nearest Tube stations are Victoria and St James's Park; and the 507 bus, which runs from Victoria to Waterloo, stops nearby. For maps, see http://www.markettaverns.co.uk/the_barley_mow.html or ask the Chairman for directions.

The cash bar will open at **6.00 pm** and those who wish to eat after the meeting can place an order. **The talk will start at 6.30 pm** and, with questions, will last about one hour.

It would be very helpful if those who are intending to come would notify the Chairman no later than the day before the meeting and preferably earlier.

24 September 2013—6.30 pm—Dr Roger Safford—Recent advances in the knowledge of Malagasy region birds

Abstract: The Malagasy region comprises Madagascar, the Seychelles, the Comoros and the Mascarenes (Mauritius, Reunion and Rodrigues), six more isolated islands or small archipelagos, and associated sea areas. It contains one of the most extraordinary and distinctive concentrations of biological diversity in the world. The last 20 years have seen a very large increase in the level of knowledge of, and interest in, the birds of the region. This talk will draw on research carried out during the preparation of the first thorough handbook to the region's birds—487 species—to be compiled since the late 19th century. The systematics of most taxa have been assessed using molecular techniques, revealing numerous surprises and a new family, the Bernieridae (tetrakas), although intriguing questions remain, not least the relationships of those two most baffling of groups, the Leptosomidae (cuckoo-roller) and Mesitornithidae (mesites). Current work is very patchy, with remarkably little study of 'natural history' despite the many gaps in understanding; an interesting exception is the explosion of work of satellite tracking of seabirds. These and other aspects will be reviewed in a wide-ranging talk.

Biography: Roger Safford has been a frequent visitor to the Malagasy region since 1988, and in 1989–93 he completed a Ph.D. on the conservation of the endemic passerines of Mauritius, visiting all of the high islands in the region and developing an intimate knowledge of the region's birds. His subsequent work has always retained a link to the Malagasy region, with numerous visits and publications, and since 2001 he has been responsible for supporting the work of the BirdLife International partnership in Madagascar.

19 November 2013—6.30 pm—Dr Christina Ieronymidou—Avian responses to land use in Cyprus, and the potential effects of agricultural change

Abstract: Land-use change in agricultural landscapes poses a major threat to bird conservation in Europe, particularly in states newly acceded to the EU. I examine how bird assemblage composition and abundance of priority species vary in relation to land use across Cyprus, and how recent changes in agricultural policy are likely to affect avian biodiversity. Sampling of the bird assemblage and habitats was conducted along line transects at 202 locations across Cyprus. Bird community composition and abundance of priority species were related to habitat structure, land use, and landscape-level land cover. Agricultural statistics and policy documents were used to quantify agricultural change. Models of farmland bird responses to landscape structure show which land cover types and land uses are most important to priority bird species, and the effect of agricultural policy on key land uses indicates the likely impact on bird biodiversity. These results permit recommendations for targeted farmland bird conservation in Cyprus and the eastern Mediterranean.

Biography: Christina Ieronymidou recently completed a Ph.D. at the Univ. of East Anglia, on 'Avian land-use associations in the eastern Mediterranean'. Following an internship on nature conservation and biodiversity policy analysis at the Institute for European Environmental Policy, she is currently working at BirdLife International, implementing a study on wildlife comeback in Europe, funded by Rewilding Europe.

The Chairman: Chris Storey, 22 Richmond Park Road, London SW14 8JT UK. Tel. +44 (0)208 8764728. E-mail: c.storey1@btinternet.com

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CLUB ANNOUNCEMENTS

Chairman's message

After the AGM on 21 May 2013, Helen Baker handed the chairmanship to myself. Helen carried out her responsibilities with tenacity, vision and good humour. She saw the need to make absolutely certain that our constitution was in good order and that the Club made proper provision in the digital age for online access to the Bulletin. Both tasks, which she skilfully completed, could have worn down a lesser person and the Club is very much in her debt. I too am in her debt and I am grateful that her immense store of knowledge, both ornithological and about the BOC, will continue to be available to the Club and myself. I am delighted that Nigel Redman has joined the committee, while the Club's grateful thanks go to Steven Gregory and Ken Heron Jones whose terms on Committee ended at the AGM. There are many challenges ahead and I look forward to hearing from members in the UK and abroad with their views about the Club and its future.

Chris Storey

ANNUAL GENERAL MEETING

The Annual General Meeting of the British Ornithologists' Club was held in the upstairs room at the Barley Mow, Horseferry Road, Westminster, London SW1P 2EE, at 5.30 pm on Tuesday 21 May 2013 with Helen Baker in the chair. Fifteen members were present. Apologies for absence were received from Nigel Crocker, Steve Dudley, David Fisher, Steven Gregory, Guy Kirwan and Robin Prytherch.

1. **Minutes of 2012 AGM.** The Minutes of the AGM held on 12 June 2012, which had been published (*Bull. Brit. Orn. Cl.* 132: 137–138, and the BOC website) were approved and signed by the Chairman.

2. **Minutes of 2012 SGM.** The Minutes of the Special General Meeting held on 12 June 2012, which had been published (*Bull. Brit. Orn. Cl.* 132: 138–139, and the BOC website) were approved and signed by the Chairman.

3. **Chairman's Review, Trustees' Annual Report and Accounts for 2012.** The document had been on the website for several days and copies were available at the meeting. The Chairman thanked Committee members, Guy Kirwan, Steve Dudley and Eng-Li Green for their contributions and support in 2012. She mentioned in particular Ken Heron Jones and Steven Gregory whose terms on Committee were ending and were not standing for appointment in another capacity. The Chairman said that 2012 had seen the Club enter into an agreement with the Biodiversity Heritage Library (BHL) under which all Bulletins (except the most recent five volumes) and Supplements were freely available on the BHL website. The Club also supported two research students, enabling them to attend the International Ornithological Congress of Southeast Asia in Thailand last November. Her concerns remained the falling membership and shortage of volunteers to run the Club.

The *Hon. Secretary* introduced the Trustees' Annual Report. He reminded members that the Club's new Rules, approved at the SGM in June 2012, came into effect immediately thereafter. The Committee had met three times and had continued to conduct much of its business by e-mail. He agreed that the fall in membership was a cause for concern. While the percentage decline was small, it was part of an ongoing trend. There had been three very good evening meetings, with talks on Black Guillemots *Cepphus grylle*, colour aberrations in birds and a double bill on John Gould's hummingbird cases and Dr George Murray Levick's unpublished notes on the sexual habits of Adélie Penguins *Pygoscelis adeliae*. In addition, the Club had supported a very successful Natural History Museum and South London Botanical Institute one-day meeting on Allan Octavian Hume last October. The two research students (from Cambodia and Indonesia) supported by BOC had expressed their appreciation to the Club. Each would receive a free copy of the 2013 Bulletin. The Bulletin continued to go from strength to strength. Vol. 132 contained a wide range of interesting, well-illustrated papers. There had not been any new BOC–BOU Joint Publications in 2012. The BOU was currently conducting an online questionnaire concerning the Checklist series and he encouraged anyone who had not completed it to do so.

The *Hon. Treasurer* drew attention to the income and expenditure details, which showed a deficit on Unrestricted Funds of £3,499 and a marginal surplus on Restricted Funds of £179 compared with an overall

surplus of £808 in 2011. However, that had included over £4,000 non-recurring items. The increase in members' subscriptions had boosted revenue and there was a small increase in investment income but sales were down, primarily because there was no new Checklist in 2012. Expenditure on the Bulletin was c.£1,000 more than in 2011 while grants had been made to the Allan Octavian Hume meeting and the students attending the IOC Southeast Asia meeting.

Stephen Chapman asked whether consideration had been given to making the Bulletin available electronically for those who wish as this would reduce production costs. The *Hon. Treasurer* said that he had discussed this with Steve Dudley but it did not appear feasible. *Ibis* is produced online by Blackwell but it was most unlikely that they would be willing to take on a journal with a much smaller distribution. Clive Mann asked what had happened to the project to produce the Bulletin on CD. The *Hon. Treasurer* said that only volumes 1–40 had been produced on CD (available for sale) and this project had been superseded by the arrangement with BHL. The *Hon. Treasurer* proposed the adoption of the Report and Accounts and this was seconded by Stephen Chapman.

4. Election of Officers and other Trustees. The Chairman proposed that Chris Storey be elected as Chairman, in her place, Robert Prŷs-Jones be re-elected as *Hon. Secretary*, David Montier be re-elected as *Hon. Treasurer* and Nigel Redman be elected to serve on the Committee in place of Ken Heron Jones whose term had ended. This was seconded by Ken Heron Jones.

5. Any Other Business. There was none.

The meeting closed at 5.54 pm.

The Chairman's review, Trustees' Annual Report and the Accounts are available on the BOC website (www.boc-online.org) and hard copies can be obtained from the *Hon. Treasurer*, D. J. Montier, Eyebrook, Oldfield Road, Bickley, Bromley, Kent BR1 2LF, UK, e-mail: djmontier@btinternet.com

The 973rd meeting of the Club was held on Tuesday 21 May 2013 in the upstairs room at the Barley Mow, 104 Horseferry Road, Westminster, London SW1P 2EE. Nineteen members and four non-members were present. Members attending were: Miss H. BAKER, K. BETTON, Cdr. M. B. CASEMENT, RN, S. CHAPMAN, M. GAUNTLETT, K. HERON JONES, J. HUDSON, R. LANGLEY, Dr C. MANN, D. J. MONTIER, R. PRICE, Dr R. PRŷS-JONES, N. J. REDMAN, P. RUDGE, P. SELLAR, A. SIMMONS, S. A. H. STATHAM, C. W. STOREY (*Chairman*) and P. J. WILKINSON.

Non-members attending were: Mrs M. H. GAUNTLETT, MRS J. HERON JONES, MRS M. MONTIER and H. WRIGHT (*Speaker*).

Dr Hugh Wright (previously Univ. of East Anglia, now Univ. of Cambridge) spoke on *White-shouldered Ibis Conservation and the value of traditional land use*. The ecology of the Critically Endangered and little-studied White-shouldered Ibis *Pseudibis davisoni* is of interest to conservationists concerned for its survival, and to scientists intrigued by its association with traditional human land uses. Hugh presented data on ibis foraging and breeding ecology, and the relationship between livelihoods and ibis conservation, collected in Cambodia for his Ph.D. Recording ibis sightings in dry forest at Western Siem Pang Important Bird Area, Hugh and his team revealed the importance of waterholes and open habitats (such as abandoned rice paddies) to foraging ibises (Wright *et al.* 2012. Foraging ecology of sympatric White-shouldered Ibis *Pseudibis davisoni* and Giant Ibis *Thaumatibis gigantea* in northern Cambodia. *Forktail* 28: 93–100; Wright *et al.* in press. Amphibian concentrations in desiccating mud may determine White-shouldered Ibis breeding season. *Auk*). They also studied the role of local land use practices in maintaining these habitats, experimentally excluding domestic livestock grazing and human-induced fires, and finding significant increases in ground vegetation as a result. These land uses are important for keeping habitats accessible to the ibis, especially in the near-absence of natural ecosystem engineers such as large herbivores, which have been lost to hunting. Local activities may not all be beneficial, however, as conservationists suggest that exploitation and interference is a limiting factor at nests. Nevertheless, deterring these actions by employing local people as nest guardians did not improve ibis nest success, and Hugh provided evidence that natural predation may be the greater threat to nests, at least at Western Siem Pang (Wright *et al.* in press. Experimental test of a conservation intervention for a highly threatened waterbird. *J. Wildl. Manag.*).

The dry-forest landscape and low-intensity agricultural land uses within it are important to local people (many of whom live in poverty) as well as to the ibis. Hugh studied livelihoods in 64 households, finding that forest products were a major source of subsistence and income, while livestock provided a valuable form of savings and insurance. Opportunities to build on mutual interests and link ibis conservation with local livelihoods may be short-lived however, as, in particular, the rise in tractors used for farming and transport is likely to replace livestock and diminish the grazing upon which the ibis depends. Mechanisation and an increasing human population are likely to change local land uses considerably; although there are now more ibises than previously thought (the global population is c.1,000 birds), the development of agriculture towards cash crops and industrial-scale agro-forestry plantations is a severe threat (Wright *et al.* in press. White-shouldered Ibis *Pseudibis davisoni* population size and the impending threat of habitat conversion.

Forktail 29). Hugh concluded that conservationists face a difficult challenge to reconcile rapidly advancing economic development (vital for local people) with the needs of a species reliant on more traditional farming and forest use.

ADDENDUM

In *Bull. Brit. Orn. Club* 133: 146, the Frankfurt specimen of Cuban Macaw *Ara tricolor* was referred to as being from the Hartert Coll. (No. 2399). In fact, this number refers to the catalogue prepared by Hartert during his fixed-term contract at the Senckenberg Museum in 1890/91 (Hartert, E. 1891. *Katalog der Vogelsammlung im Museum der Senckenbergischen Naturforschenden Gesellschaft in Frankfurt am Main*. Gebrüder Knauer, Frankfurt). The specimen was also listed in Mayr, G., Peters, D. S. & Böhm, K. 2004. Ausgestorbene und gefährdete Vögel in den Sammlungen des Forschungsinstitutes und Naturmuseums Senckenberg. *Abhand. Senckenberg. Naturfor. Gesell.* 560: 1–101. I am grateful to Dr A. Manegold for drawing this matter to my attention.—THE HON. EDITOR.

Breeding birds of Hatuta'a, Marquesas Islands: species inventory and influence of drought on their abundance

by Jean-Claude Thibault, Alice Cibois, Jean-François Butaud, Frédéric A. Jacq, Elie Poroi & Jean-Yves Meyer

Received 29 January 2013

SUMMARY.—Hatuta'a (or Hatutu) is a small, remote, uninhabited island located in the northern Marquesas Islands (French Polynesia) that supports a rich seabird assemblage of at least 15 breeding species and four landbird species, including the largest population of the rare Marquesas Ground Dove *Gallicolumba rubescens*. We present data collected from 1922 to 2010 on the breeding birds of Hatuta'a and discuss the influence of a severe drought, observed in 2010, on their distribution and abundance. Numbers of Marquesas Ground Doves and Northern Marquesas Reed Warblers *Acrocephalus percernis* appear to fluctuate according to wet and dry periods that markedly affect the vegetation.

The Marquesas Islands (French Polynesia) are located in the south-east Pacific Ocean at 07–11°S and 139–141°W, c.500 km north of the Tuamotu archipelago and 1,300 km north-east of the Society Islands (Fig. 1). Their climate is a mix of 'humid tropical' and 'arid tropical' (Laurent *et al.* 2004). Because of their exposure to south-eastern humid winds and their

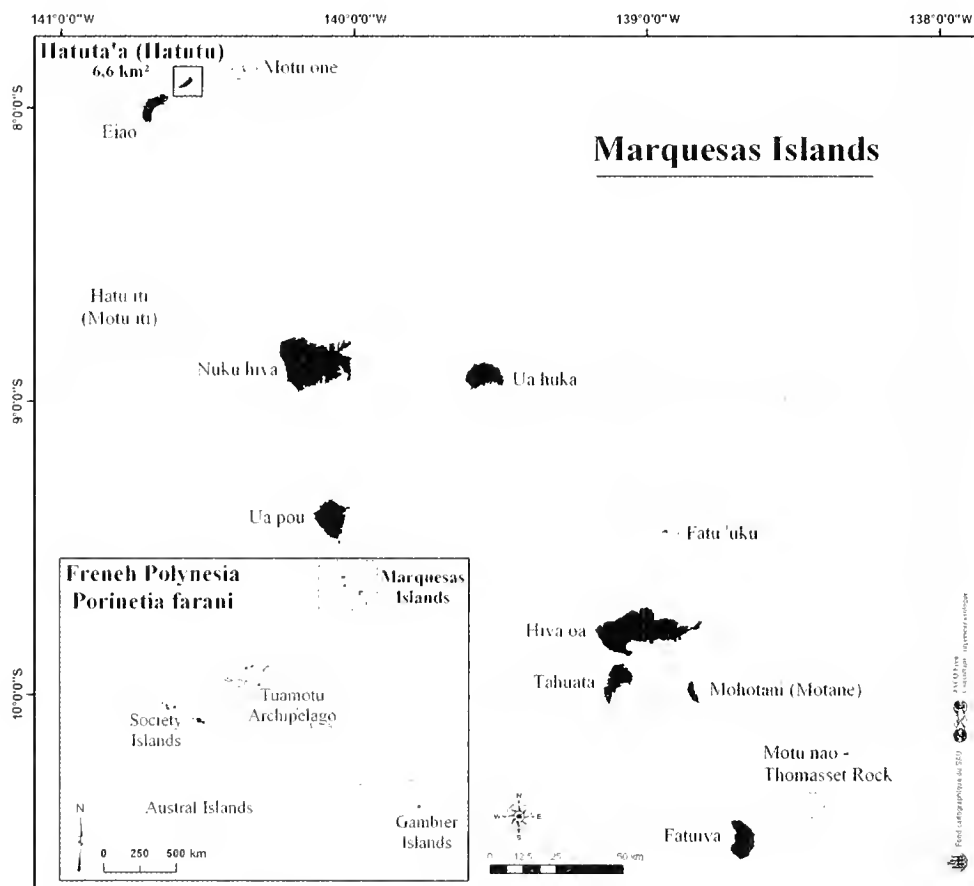


Figure 1. Map of the Marquesas Islands and location of Hatuta'a.

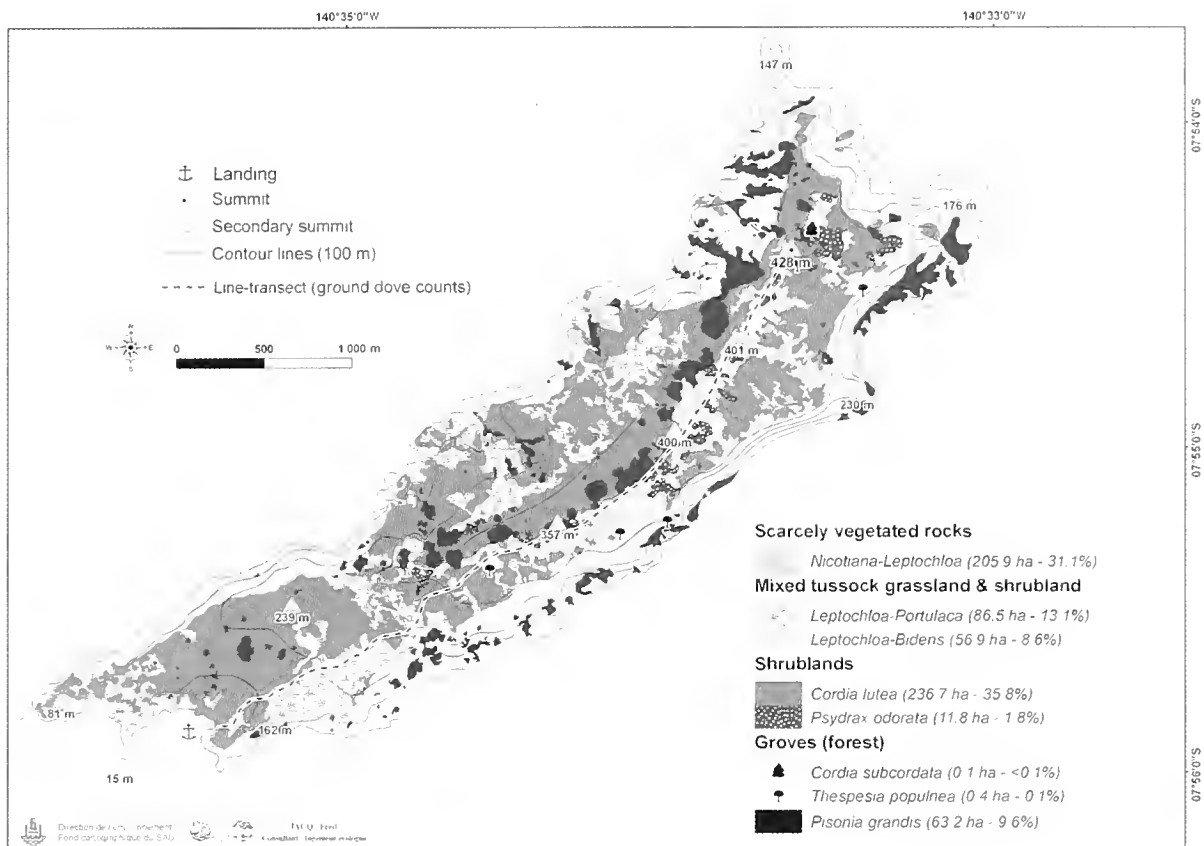


Figure 2. Topographic vegetation map of Hatuta'a and location of the transect used to census Marquesas Ground Doves *Gallicolumba rubescens* in 2010 (modified from Butaud & Jacq 2007)

high elevation, most of the Marquesas exhibit a dry to wet altitudinal gradient (Florence & Lorence 1997, Gillespie *et al.* 2011). Hatuta'a, also called Hatutu (07°926'S, 140°578'W) is a small (6.6 km²) remote and uninhabited island in the north of the archipelago, comprising a plateau with a low slope oriented west to east (max. elevation 428 m) and surrounded by sea cliffs (Fig. 2). It is a typical 'dry island' (Decker 1973) regularly subjected to severe droughts. There is no permanent standing water, only temporary pools on the ground or on flat rocks, formed after rain. Low vegetation comprising largely succulent herbs (*Portulaca* spp.), tussocky grass (*Leptochloa xerophila*) and xerophitic shrubs (*Cordia lutea*, *Waltheria tomentosa*), along with scattered groves of larger trees (*Pisonia grandis*, *Thespesia populnea*) cover most of the island. The vascular flora comprises just 26 native species (Florence *et al.* 2007, Butaud & Jacq 2007, 2009, 2011; J.-Y. Meyer unpubl. data 2010).

Hatuta'a has been classified as a 'Territorial Natural Reserve' since 1971 and 'Habitats and Species Management Area' since 2000 (Meyer 2007, Meyer & Salvat 2009). Decker (1973: 66) described it as 'a pristine terrestrial ecosystem—the only sizeable one left undisturbed in the central Pacific dry zone'. The two kinds of oceanic upwelling within the region (Rougerie *et al.* 1992, Rougerie & Wauthy 1993) provide nutrient-rich waters and contribute to the diversity of seabirds, which are well represented on Hatuta'a. On the other hand, a dry climate and small island size probably has contributed to the paucity of landbirds on Hatuta'a, where only four species are known, in contrast to as many as ten on larger islands in the Marquesas. This paper presents a list of the breeding birds of Hatuta'a, an island rarely visited by naturalists, with documented changes since the early 20th century, and records the impact on landbirds of the severe drought of 2010.

TABLE 1

Sources of information on the birds of Hatuta'a. Acronyms: CEPA = Conservation des Espèces et des Populations Animales, CNRS = Centre National de la Recherche Scientifique, EPHE = Ecole Pratique des Hautes Etudes, ORSTOM = Office de la Recherche Scientifique et Technique Outre-Mer (now = Institut pour la Recherche et le Développement), PES = Pacific Entomological Survey, SOP = Société d'Ornithologie de Polynésie.

Visitors	Dates	Sources
R. H. Beck (WSSE)	26–29 September, 2–5, 8, 10–12 October 1922	Beck (ms)
A. M. Adamson (PES)	October 1929	Adamson (1936)
G. Lebronnec & Tauraa (PES)	April 1931	
J.-C. Thibault (ORSTOM-EPHE)	18–28 September 1975	Thibault (1989)
S. L. Montgomery, W. C. & B. H. Gagné (Univ. of Hawai'i, Bishop Mus.)	9 August 1977	Montgomery <i>et al.</i> (1980)
J.-C. Thibault (EPHE)	8–13 August 1987	Thibault (1989)
C. Blanvillain & J.-M. Lernoould (CEPA/SOP)	April 2002	Blanvillain & Lernoould (2003)
B. Gangloff (CNRS) & P. Raust (SOP)	11–14 March 2007	Gouni & Raust (2007)
P. Raust (SOP)	17 August 2008	Raust (2008)
J.-F. Butaud & F. Jacq	5–8 June 2010	This work
A. Cibois, J.-Y. Meyer, E. Poroi & J.-C. Thibault	15–19 November 2010	This work

Methods

Our sources of ornithological data for Hatuta'a include unpublished notes of the Whitney South Sea Expedition (WSSE) archived at the American Museum of Natural History, New York (AMNH), various published expedition and research reports (see Table 1), data from museum specimens at AMNH and the Muséum national d'Histoire naturelle, Paris (MNHN), and field work conducted by the authors in June and November 2010. Bird censuses conducted at different times were difficult to compare due to heterogeneity among observers. However, we used these data to assess status of breeding birds and report on population trends where evident. Our studies of landbirds focused largely on the Marquesas Ground Dove, a Vulnerable species (BirdLife International 2013) found only on Hatuta'a and Fatu'uku in the Marquesas. In November 2010, two teams of observers independently geo-referenced (GPS Garmin) the same c.40 m-wide line transect between the landing site and the summit (Fig. 2). Bird counts were segregated into four 100-m altitudinal zones. Transects were linked to a vegetation map indicating the estimated area of the different vegetation types. This topographic vegetation map results from analysis of aerial photographs taken in 2003 compared to field data from 2007 (Butaud & Jacq 2007).

Results and Discussion

Seabirds.—Table 2 summarises data on status and number of seabirds obtained between 1922 and 2010. With 15 to 19 breeding species, Hatuta'a supports most of the seabird diversity of the Marquesas Islands (21 species in total). However, this diversity obscures the small numbers of breeders of most species, especially terns and boobies, and contrasts with the very large colonies of Sooty Terns *Onychoprion fuscatus* found in some years on other small islands in the Marquesas (Holyoak & Thibault 1984).

TABLE 2

Data on status and number of breeding seabirds from 1922 to 2010. Empty cells correspond to lack of record (see text for references).

Species	September–October 1922	September 1975	August 1987	March 2007	June and November 2010
Herald Petrel <i>Pterodroma heraldica</i>					one displayed with Phoenix Petrels (18 November); status unknown
Phoenix Petrel <i>Pterodroma alba</i>	at least 17 collected; several dozen present	c.30 pairs	one individual	250 pairs	uncommon in June; c.100 in Nov.
Bulwer's Petrel <i>Bulweria bulwerii</i>	five collected at sea				several seen at sea near Hatuta'a (8 June)
Christmas Shearwater <i>Puffinus nativitatis</i>	at least 19 collected, including two chicks	several seen at dusk flying to the plateau			several pairs displaying in the morning at south cliffs (November)
Wedge-tailed Shearwater <i>Puffinus pacificus</i>	at least 11 collected; small colonies	several tens of pairs		possibly heard	
Tropical Shearwater <i>Puffinus bailloni</i>	one chick collected; numerous at sea	heard at dusk and early in the morning mainly on the west side (slopes covered by tussock grass)			
White-throated Storm Petrel <i>Nesofregetta fuliginosa</i>	two adults collected at sea				several dozen seen at sea near Hatuta'a (8 June)
Red-tailed Tropicbird <i>Phaethon rubricauda</i>	eight collected including two chicks	several pairs displaying			20–30 pairs around cliffs of north and south coasts
White-tailed Tropicbird <i>Phaethon lepturus</i>	one visiting a hole in a cliff			one in flight	a pair flying along southern cliffs (November)
Great Frigatebird <i>Fregata minor</i>	12 collected; numerous nests observed	c.300 occupied nests on north and west slopes	c.200 occupied nests, mainly on west slope	150–200 occupied nests on west slope	breeding in June; >1,000 occupied nests in November
Lesser Frigatebird <i>Fregata ariel</i>	at least two chicks collected; nests observed on leeward side	200–300 occupied nests at the same place	no breeding colony	no breeding colony	no breeding colony
Masked Booby <i>Sula dactylatra</i>		three pairs	11 pairs	37 pairs (c.150–200 pairs)	breeding in June; 74 nests (c.100–150 pairs) in November
Red-footed Booby <i>Sula sula</i>	five collected; numerous breeder in trees and shrubs	several hundred nests	several hundred nests	c.50–100 pairs	breeding in June; >1,000 pairs in November
Brown Booby <i>Sula leucogaster</i>	six collected	65 occupied nests	54 occupied nests	c.100–150 pairs, mainly on plateau	breeding in June; 20 occupied nests; several tens of non-breeders in November

Species	September–October 1922	September 1975	August 1987	March 2007	June and November 2010
Grey-backed Tern <i>Onychoprion lunatus</i>	one male collected in breeding condition				
Sooty Tern <i>Onychoprion fuscatus</i>	at least six collected; nests on western islet and on plateau	200–400 pairs breeding on western islet and 1,000 pairs on plateau	breeding on western islet and 300 pairs on plateau	a few dozen on western islet	several tens breeding on western islet in June; no breeding in November
Brown Noddy <i>Anous stolidus</i>	nine collected; not numerous and not breeding	several dozen pairs breeding	several dozen pairs breeding	several pairs breeding	breeding in June; several dozen pairs, but not breeding in November
Black Noddy <i>Anous minutus</i>	12 collected; numerous, but not breeding	several dozen at roost; not breeding	several hundred pairs breeding	200–500 pairs breeding	breeding in June; >1,000 pairs on fresh nests, but no eggs or chicks in November
Blue Noddy <i>Procelsterna cerulea</i>	three collected	several pairs breeding on west cliffs	several pairs breeding on west cliffs		breeding in June; several dozen pairs on west and south cliffs in November
White Tern <i>Gygis alba</i>	'common' and at least 17 specimens collected	several hundred pairs breeding	c.700 pairs breeding pairs	several hundred breeding pairs	breeding in June; >1,000 pairs, but no breeding in November

Breeding uncertain. Two species, Polynesian Storm Petrel *Nesofregatta fuliginosa* and Bulwer's Petrel *Bulweria bulwerii*, have been recorded at sea close to Hatuta'a, but never ashore. A Grey-backed Tern *Onychoprion lunatus* in breeding condition was collected in 1922, but no subsequent evidence of its presence exists. White-tailed Tropicbird *Phaethon lepturus*, recorded several times, might breed in small numbers. A single Herald Petrel *Pterodroma heraldica* (pale morph) displayed in flight with a small group of Phoenix Petrels *P. alba* on 18 November 2010.

Regularly recorded species. Twelve species were recorded by most observers: Phoenix Petrel, Wedge-tailed Shearwater *Puffinus pacificus*, Christmas Shearwater *P. nativitatis*, Tropical Shearwater *P. bailloni*, Red-tailed Tropicbird *Phaethon rubricauda*, Red-footed Booby *Sula sula*, Brown Booby *S. leucogaster*, Great Frigatebird *Fregata minor*, Blue Noddy *Procelsterna cerulea*, Brown Noddy *Anous stolidus*, Black Noddy *A. minutus* and White Tern *Gygis alba*. Numbers of Phoenix Petrel are relatively small, with some variation, possibly related to a complex breeding cycle undetected by infrequent visitors (see Schreiber & Ashmole 1970). However, Hatuta'a is one of the species' few known breeding sites (Brooke 2004, Gangloff *et al.* 2009). Numbers of Great Frigatebirds were large during every visit, and the island represents this species' most important breeding locality in the Marquesas.

Irregular breeders. Lesser Frigatebird *Fregata ariel* has not bred since 1975, while Sooty Tern populations have varied over the years, with the lowest numbers in 2007 and 2010.

Colonisers. Although known from subfossil remains (Steadman 2006), Masked Booby *Sula dactylatra* was not recorded by the WSSE in the first quarter of the 20th century (Beck ms, Quayle ms). The first record, of a few pairs, on Hatuta'a was in 1975, with 100–200 pairs in the 2000s.

TABLE 3

Numbers of breeding landbirds between 1922 and 2010. Periods of severe drought are shaded (see text) and empty cells correspond to lack of record.

Species	September– October 1922	September 1975	August 1987	March 2007	June 2010	November 2010
Pacific Reef Heron <i>Egretta sacra</i>		one pair and a juvenile; one empty nest	one only; two empty nests		at least two	one pair
Spotless Crake <i>Porzana tabuensis</i>	several specimens collected	one only	recorded individually or in pairs at 11 localities	four	not recorded	not recorded; no response to playback
Marquesas Ground Dove <i>Gallicolumba rubescens</i>	common, 73 collected	c.200–250	c.200–250	c.1,070	148 counted	<200 (see Table 4 for details)
Northern Marquesas Reed Warbler <i>Acrocephalus percernis postremus</i>	22 collected	c.35–50 pairs	c.35–50 pairs	c.50–100	uncommon	c.15

Landbirds.—Only four species breed on Hatuta'a (Table 3), one each from the Ardeidae, Rallidae, Columbidae and Acrocephalidae. Pacific Reef Heron *Egretta sacra* occurs on nearly all of the main Marquesas, but at low densities, making the occurrence of only several pairs on Hatuta'a unsurprising. The lack of records of Spotless Crake *Porzana tabuensis* in 2010, despite use of playback in November, is surprising because it was encountered during nearly all previous visits. Its apparent absence may be attributable to the severe drought (see below). Marquesas Ground Dove is endemic to the archipelago and occurred on several islands in the past (Nuku Hiva: Gray 1859; Hiva Oa, Tahuata and Ua Huka: Steadman 2006). Today, it is confined to the smallest islands of Fatu'uku (= Fatu Huku), where a few pairs were recorded in 2011 (Butaud 2011), and Hatuta'a, with the largest remaining population. Both islands are refugia from predators (e.g. feral cats, Black Rat *Rattus rattus* and pigs, which are otherwise widely distributed in the Marquesas). Counts conducted on Hatuta'a in November 2010 (Table 4) revealed a sharp decline compared to 2007 (Table 3). Over the years, Marquesas Ground Dove has been found throughout the island, from shore to summit, including cliffs. They forage on the ground in most habitats, less frequently in trees, and are most abundant in mixed tussock grassland (*Leptochloa xerophila*, *Portulaca* spp.) and subshrub (*Bidens beckiana*), which cover just 21.7% of the island (Fig. 2). Northern Marquesas Reed Warbler *Acrocephalus percernis* is known from only four islands in the northern Marquesas, with each island inhabited by an endemic subspecies (Cibois *et al.* 2007)—*A. p. postremus* occurs on Hatuta'a. Twenty-two specimens were collected on Hatuta'a in 1922 and as many as 100 birds were observed in each of 1975, 1987 and 2007, but many fewer in 2010 (Table 3). Overall, the numbers of individuals and population density are much lower for *A. p. postremus* compared to other populations of *A. percernis* and Southern Marquesas Reed Warbler *A. mendenae*, which is endemic to the southern Marquesas (AC & J-CT unpubl.).

Consequences for birds of the 2010 drought.—Several severe droughts affecting the vegetation of Hatuta'a have been described (Beck ms, Adamson 1936, Blanvillain & Lernoould 2002). More recently, in 2002 and 2010, droughts resulted in complete defoliation and the disappearance of many plants over much of the island. In March 2007, the vegetation



Figure 3. Vegetation of Hatuta'a during wet and dry periods: (a) West coast. Left: relatively 'green' aspect (August 1987). Right: during severe drought, *Pisonia* trees and *Walteria*–*Cordia* shrubland mostly defoliated (November 2010) (J.-C. Thibault); (b) Ridge in front of Eiao. Left: subshrub (*Bidens*) and shrub (*Walteria*) in front, and trees (*Pisonia*) behind, with their leaves (March 2007) (© Benoît Gangloff). Right: same patch of vegetation completely defoliated (November 2010) (J.-Y. Meyer); (c) Near the summit. Left: patches of succulent herbs (*Portulaca* spp.), tussock grass (*Leptochloa xerophila*) and shrubs (*Cordia*) (March 2007). Right: defoliated shrubs and bare ground (June 2010) (J.-F. Butaud)

was luxuriant, but in June 2010 it was largely defoliated. Some water was trapped in rocky depressions in gullies at the time of the June visit, indicating recent rainfall, but largely dry conditions apparently persisted for the next few months as trees and shrubs were defoliated and ground cover largely absent in November (Fig. 3). Changes in the vegetation in 2010 did not appear to affect seabird breeding. We observed nesting Great Frigatebirds in the defoliated *Cordia lutea*, Red-footed Booby in defoliated *Pisonia grandis*, Brown and Masked Boobies on bare ground, and Phoenix Petrels in dry tussock grass *Leptochloa xerophila*.

TABLE 4

Results of Marquesas Ground Dove *Gallicolumba rubescens* surveys on Hatuta'a in November 2010.

Habitat	Area investigated (ha)		Number of birds counted		Density (birds/ha)		Total area (ha)	Number estimated	
	Count 1	Count 2	Count 1	Count 2	Count 1	Count 2		Count 1	Count 2
<i>Leptochloa-Portulaca</i> (0–100 m)	2	1.2	0	0	0	0	21.0	0	0
<i>Leptochloa-Portulaca</i> (100–200 m)	10.7	1.52	1	0	0.09	0	23.1	2	0
<i>Leptochloa-Portulaca-Bidens</i> (200–300 m)	7.8	3.4	2	4	0.25	1.18	39.2	10	46
<i>Leptochloa-Portulaca-Bidens</i> (>300 m)	c.10	12.6	23	31	2.3	2.46	60.1	138	148
<i>Pisonia grandis</i>	c.15	--	5	--	0.33	--	63.0	21	--
<i>Cordia lutea</i>	c.5	c.5	0	0	0	0	236.6	0	0
Other habitats not occupied							218.4		
Totals							661.4	171	194

The 2010 drought appeared to have a marked affect on populations of at least three of the landbirds. Only Pacific Reef Heron, which forages mainly in marine habitats, seemed unaffected. We attribute the lack of records of Spotless Crake in 2010 to diminished numbers, as well as their being more secretive because of drought-induced reduction in vegetation cover, rather than the species being absent from the island. In the case of the ground dove, numbers drastically declined between March 2007 and November 2010, when birds were mostly concentrated at the (probably more humid) summit and where available habitat covers just 43.5 ha. They were less frequently seen in groves of *Pisonia grandis* and on cliffs on the south side; shrublands of *Cordia lutea* were used to hide from observers and for protection against attacks by frigatebirds. Numbers of ground dove encounters diminished further between June and November 2010, and their range was more restricted. They were encountered at elevations as low as 50 m in June, but not below 100 m in November. Numbers of reed warblers also declined (Table 3). The defoliated *Cordia lutea* was abandoned, in favour of *Pisonia* groves that are probably richer in invertebrates in the leaf litter. No song was heard and all nests were empty, suggesting no recent breeding. A similar situation was noted by the WSSE in 1922, during another severe drought, when all specimens were sexually inactive (Beck ms; AMNH specimens). Conversely, breeding was recorded during a normal wet period when the vegetation was green (Thibault 1989). During most of the dry periods, reed warblers bred on neighbouring Eiao, where the drought was less severe as the island's higher elevation captured rain clouds (Thibault 1989; AC & J-CT unpubl.; AMNH specimens). We suspect that on Hatuta'a, the droughts led to a decrease in resources for landbirds, mainly invertebrates for the reed warbler and seeds for the ground dove. We are uncertain of the rainfall in 2011, but in October 2012 photographs taken from offshore show the vegetation to be only partially defoliated. At this time, Marquesas Ground Doves were again 'abundant' (X. Curvat pers. comm. November 2012 to J-CT).

Our records of Hatuta'a's breeding birds and native biota indicate that they appear relatively well adapted to periodic droughts. In view of global change, with increasing air temperatures (IPCC 2007) and potentially more frequent and intense droughts, the island

may lose its natural resilience to these climatic fluctuations in the future, which would probably dramatically impact its endemic avifauna and flora. We recommend that this protected area of high ecological value should be carefully monitored as a 'sentinel island site' for French Polynesia's terrestrial biodiversity.

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Alta Floresta revisited: an updated review of the avifauna of the most intensively surveyed locality in south-central Amazonia

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SUMMARY.—Without adequate knowledge of species distributions and life-history characteristics it is impossible to undertake robust analyses to answer even basic biogeographical questions or undertake evidence-based conservation planning. We present a follow-up to the first avifaunal inventory from Alta Floresta, Mato Grosso, Brazil (Zimmer *et al.* 1997) following an additional 17 years of field work. We add 124 species to the regional list and clarify the status of others. Many of the species reported here are poorly known, therefore we present data on their status and distribution, both at Alta Floresta and other Amazonian localities.

The tropical forests of South America, particularly those of the Amazon basin, host the highest avian species richness on earth (Wallace 1878, Amadon 1973, Haffer 1978, 1990), yet coverage by even basic avifaunal inventories of much of the region is incredibly poor (Oren 2001). No area in southern Amazonian Brazil has been sampled as intensively over the past two decades as that surrounding the town of Alta Floresta (09°53'S, 56°28'W), in north-central Mato Grosso astride the rio Teles Pires, a primary tributary of the rio Tapajós. From the perspective of traditional morphology based taxonomy, the rio Teles Pires may not appear to be an important faunal barrier (Bates *et al.* 2004), yet the region is of considerable biogeographic significance because it lies close to the transition between Amazonian *terra firme* forest and *cerrado*, and between postulated centres of endemism—the Belém / Pará and Rondônia areas (Cracraft 1985, Haffer 1985), with the former sometimes subdivided into the Xingu and Tapajós regions (Silva *et al.* 2002). Inauspiciously, the region also lies at another frontier, the 'Arc of Amazonian Deforestation', which represents the most aggressive frontier of tropical deforestation on earth (FAO 2006, Giglio *et al.* 2006).

Alta Floresta was founded in 1976 by southern Brazilian colonists and urban planners with the objective of colonising the upper rio Tapajós basin. Prior to 1976, the region was covered by undisturbed Amazonian forest of relatively uniform physiognomy (Oliveira-Filho & Metzger 2006). The region lies at 200–300 m elevation and its soils are predominantly ultisols with some oxisols (RADAMBRASIL 1983), which are the principal soil types in the Brazilian Amazon (Moraes *et al.* 1995). Mean annual rainfall is 2,350 mm, and the evapotranspiration rate is 1,000 mm / p.a., providing a 1,350–1,400 mm / p.a. surplus; however, in the dry season (May–August) there is a hydrological deficit of 250–300 mm (RADAMBRASIL 1983).

Relative to many central Amazonian sites, the study area exhibits high habitat heterogeneity. Much of its northern third is dominated by primary *terra firme* and seasonally flooded forests, with smaller patches of stunted, drought-deciduous forest atop small granitic *serras* (located almost exclusively on the right bank of the rio Teles Pires). Typical *terra firme* forests in the study area are classified as open, tropical submontane rainforest with lianas (RADAMBRASIL 1983), and the forest canopy often includes emergents from the families Lecythidaceae (e.g., *Bertholletia excelsa*, *Cariniana* spp.) and Leguminosae (*Cedrelinga*

catenaeformis and *Dussia* spp.) (Sasaki *et al.* 2008). Other dominant trees include Leguminosae (*Dipteryx odorata*, *Hymenaea* spp., *Enterolobium* spp.), Moraceae (*Clarisia racemosa*, *Perebea* spp.), Sapotaceae (*Pouteria* spp., *Micropholis* spp.), Combretaceae (*Buchenavia* spp.) and Euphorbiaceae (*Alchorneopsis* spp.). In contrast, pockets of semi-deciduous forests nested within a matrix of tall *terra firme* forest and typically occurring on areas of steeper relief are dominated by the families Anacardiaceae (*Spondias* spp.), Apocynaceae (*Aspidosperma* spp.), Bignoniaceae (*Tabebuia barbata*, *T. capitata*, *Tabebuia* spp.), Bombacaceae (*Bombacopsis* spp., *Pseudobombax* cf. *longiflorum*), Cochlospermaceae (*Cochlospermum orinocense*), Leguminosae (*Anadenanthera peregrina*, *Chloroleucon acacioides*, *Hymenaea courbaril*, *Platymiscium duckei*), Meliaceae (*Cedrela odorata*), Myrtaceae (*Eugenia* spp.), Rubiaceae (*Coutarea hexandra*, *Dialypetalanthus fuscescens*), Rutaceae (*Zanthoxylum rhoifolium*) and Vochysiaceae (*Callisthene fasciculata*) (Sasaki *et al.* 2008). In the extreme north of the study area there are extensive *Mauritia* palm swamps and oxbow lakes. The southern two-thirds are dominated by anthropogenic land uses, with the non-forest matrix representing principally managed and unmanaged cattle pasture with smaller areas of agro-forestry and limited cultivation of crops (mostly corn, soybeans and rice). Between 1984 and 2004, 3,607 km² of forest was lost from a 7,295 km² region south of the Teles Pires, corresponding to a decline in forest cover of 91.1% to 41.7% over 20 years (Michalski *et al.* 2008) after which deforestation rates decreased. This loss has led to the rapid collapse of avifaunal communities in many of the small forest fragments that remain (Lees & Peres 2006).

The first inventory of birds in the region (Zimmer *et al.* 1997), based on nearly 70 days of field work in October 1989–September 1995, produced a total of 474 species. The sites included in the original survey were scattered across an 1,800 km² polygon (defined simply by the total area encompassed by the perimeter of all sites visited), but the actual area surveyed amounted to c.30 km², with an estimated 90% of the effort being restricted to an area <15 km² (Fig. 1, Zimmer *et al.* 1997). The huge discrepancy between the large size of the study area, and the much smaller area actually surveyed was primarily the result of including a single site c.60 km south-west of Alta Floresta at Garimpo do Cabeça (10°22'S, 56°25'W)—not 45 km south-east (Zimmer *et al.* 1997). This site was visited only once, in 1989, yet it represented the only field work conducted south of Alta Floresta prior to the publication of the original survey (Zimmer *et al.* 1997), and it produced several noteworthy records for the region. In the 15 years following the first survey, resident and visiting ornithologists have conducted extensive investigations over a much larger part of the study area. Moreover, survey effort prior to 1997 was conducted almost exclusively in August–November (when many migrants may be absent), and was restricted to a small number of existing trails, so some habitat types were sampled poorly or not at all. More recent work has expanded the coverage to all months, and has been aided by a proliferation of new trails that have increased access to both banks of the rio Teles Pires and the rio Cristalino. Concomitantly, many forest patches and the open country south of Alta Floresta have now been surveyed, so coverage is far more representative of the region as a whole. Conversely, several sites surveyed in the first inventory (e.g., the 'Teles Pires Trail' of Zimmer *et al.* (1997), here referred to as the 'Gold Miners' Trail') have been completely denuded.

We detail the many additions to the region's avifauna based on field work conducted through 31 December 2012. Although some of these reflect new arrivals to the region, many probably reflect better coverage of the area and better knowledge of the vocalisations of some species. Similarly, many of the species reported here for the first time were expected, but others represent range extensions of biogeographical significance. We provide accounts for all 124 species added to the Alta Floresta list since the 1997 publication including both an overview of recent reports and sufficient background to consider these records in a broader

Figure 1. The greater Alta Floresta region delimiting the area sampled and illustrating the extent of deforestation through 2011. Remaining closed-canopy forests are shown in black and non-forested regions in grey. The four-pointed star marks the location of Cristalino Jungle Lodge (CJL) and the five-pointed star the centre of Alta Floresta town.



geographical context. To better partition the many species added to the list, we group accounts by habitat (*terra firme* forest, transitional forest, wetlands and river edge, edge, and non-forest species) and by migratory status (austral, intra-tropical, and boreal migrants).

Methods

Study region.—We delimit the Alta Floresta ‘region’ to the same 1,800 km² polygon in the first survey (Fig. 1, Zimmer *et al.* 1997). Most field work in the 1995–2012 period was concentrated in the same area as the first survey—principally the trail network of the Cristalino Jungle Lodge (CJL), within the Reserva Particular do Patrimônio Natural Cristalino (formerly Reserva Florestal Cristalino), and in the isolated, 230-ha forest fragment

adjacent to the Floresta Amazônica Hotel (FAH) at the south-west edge of the town of Alta Floresta. CJL now possesses >24 km of trails that traverse: river edge / seasonally flooded forest (Cacau, Manakin and Kwall's Trails), tall *terra firme* forest (Rochas, Figueira, Castanheira, Serra Nova and Cajá Trails), forest dominated by extensive thickets of *Guadua* bamboo (Haffer and Taboca Trails), and semi-deciduous forest growing atop a granitic dome (parts of both the Serra and Serra Nova Trails). The addition of two observation towers (I & II), each 50 m tall, has further facilitated study of the forest canopy. Tower I was built in 2001 and is 1 km from the lodge on the right bank of the Cristalino on the Rochas Trail, and Tower II was constructed in 2010 and is on the left bank of the Cristalino downstream of the lodge, with the trailhead located off the Cacau Trail. The Alta Floresta region is therefore the ornithologically best-inventoried area in southern Amazonia and represents a major centre for ecotourism (Whitney 1997, Lees 2011). ACL spent >500 days in the field around Alta Floresta in April 2003–October 2006, surveying forest fragments, continuous *terra firme* forest (Lees & Peres 2006, 2008a), corridors in seasonally flooded and riparian forest (both *igapó* and *várzea*; Lees & Peres 2008b), gap sites (Lees & Peres 2009) and agricultural areas (Mahood *et al.* 2012) across the entire region. BJWD spent 290 days there between January 2004 and August 2007 before moving permanently to Alta Floresta in March 2008. The other authors spent the following periods: KJZ—72 days (August 1991, October 1992, and September 1993–99 and 2005), CAM—106 days (95 days in October 1997–January 1998 and 11 days in August 2005), AW—101 days (September 1993–2000, August and November 1996, June–August and November 2003, September 2005 and August 2010), and BMW—110 days (September 1993 and 1995–2002, June 2005–11).

The original survey devoted much effort to forested sites along the road between Alta Floresta and the rio Teles Pires, especially along the abandoned Gold Miners' Trail (the 'Teles Pires Trail' in Zimmer *et al.* 1997, which should not be confused with a relatively new trail with the same name at CJL), located 28 km north of town, which traversed extensive thickets of *Guadua* bamboo and tall *terra firme* forest (Zimmer *et al.* 1997). Since the original survey, all of these sites, including the Gold Miners' Trail, have either been replaced by pastures or reduced to degraded fragments. Consequently, since 1996, there has been less intensive coverage of what had been extensive *terra firme* forest on the west (south) bank of the rio Teles Pires, simply because so little of this habitat is intact and accessible. Nevertheless, ACL surveyed five forest patches of >5,000 ha on the west bank of the river, including 'Fazenda Cristalino,' which is now within the trail network at CJL. Open agricultural habitats were poorly sampled during the first survey, yet they are now both more widespread and better surveyed because they represent the dominant habitat type south of the rio Teles Pires.

Avian status in the region.—We present qualitative estimates of avian abundance based on frequency of detection (visual or auditory) and reflecting our impression of population density in preferred habitats. For ease of comparison, we use the same abundance categories as the initial survey (Zimmer *et al.* 1997): 'common' species are those for which five or more individuals were encountered daily in appropriate habitat, 'fairly common' species were encountered either irregularly in numbers or as 1–5 birds on most days in appropriate habitat, 'uncommon' species were encountered periodically but not daily, and 'rare' species were encountered only a few times per season, even in appropriate habitat. Given the much more extensive coverage since the first survey, we consider that the avifauna is now sufficiently known to add a new category of 'very rare' for those species recorded on fewer than ten occasions. Most of these are assumed to be rare visitors or vagrants, but a few are probably resident at very low densities. Seasonal status is denoted for those species for which abundance varies over the year. 'Austral migrants' breed in the

south and move north during the austral winter (April–September), ‘boreal migrants’ arrive from North America for the northern winter (with landbirds typically present October–April, but shorebirds arrive from mid July), and ‘unspecified intratropical migrants’ that move within tropical South America at as yet undetermined spatiotemporal scales that result in seasonal periods of lower abundance or even absence.

We ranked hierarchically the evidence documenting each species in the region, but we present only the strongest available evidence for each (Appendix). We regard specimens as the most definitive evidence, followed by a published or archived photograph, video or audio recording that confirms the identification and provides a permanent record that can be examined by others. The weakest evidence is provided by field encounters (either visual or audio) without supporting physical evidence. Species within their expected range, and for which there have been repeated encounters in the region over the years by numerous qualified observers, are included on the primary list, even if physical evidence is unavailable. By contrast, we require physical documentation for records that represent range extensions, or those involving species seen only very rarely in the region (even if plentiful at nearby sites), and in the absence of such documentation, we treat them as hypothetical. We removed completely three species that either were unambiguously re-identified or were deemed extremely unlikely based on biogeography, and which lacked documentation. All specimens from the region are, to our knowledge, housed at the Museu Paraense Emílio Goeldi (MPEG), Belém, Pará, Brazil. Voucher audio recordings are or will be deposited at one or more of the following institutions: the Macaulay Library, Cornell Lab of Ornithology, Ithaca, New York (LNS), Arquivo Sonoro Natural, Universidad Estadual de Campinas, São Paulo (ASN), and British Library Sound Archive, London (BLSA). Many recordings and images from this region are included in the commercial production *Bird voices of Alta Floresta and southeastern Amazonian Brazil* (Marantz & Zimmer 2006) and online at <http://macaulaylibrary.org/>, <http://www.xeno-canto.org> and www.wikiaves.com.br, while species vouchered on these sites are listed in the Appendix.

Results

We present a list of 586 bird species reported from the Alta Floresta region through 31 December 2012, an increase of 124 species on the first survey. Of these, 566 species (96%) are documented either by a specimen, photograph or voucher recording (audio/video), and 524 (89%) are available online as publically accessible, digital vouchers. Recordings made in the region for 256 species (44%) are included in a published set of audio recordings (Marantz & Zimmer 2006).

Species removed from the Zimmer *et al.* (1997) list

PEARLY ANTSHRIKE *Megastictus margaritatus*

Listed by Zimmer *et al.* (1997) as hypothetical from a single, undocumented sighting on the west bank of the rio Teles Pires in October 1990 (R. Ridgely, V. Emanuel & G. Tudor). No subsequent reports, but the area is no longer forested. The closest known sites to Alta Floresta are on the left bank of the rio Roosevelt, Amazonas (Marantz & Zimmer 2006, Whittaker 2009), 520–560 km west-northwest of Alta Floresta. We suspect it does not occur east of the rio Tapajós / rio Juruena (Zimmer & Isler 2003).

BLACK-AND-WHITE TODY-FLYCATCHER *Poecilatriccus capitalis*

Included by Zimmer *et al.* (1997) based on a female seen and tape-recorded (ML48203) by M. & P. Isler at the Gold Miners’ Trail on 7 November 1989, and subsequently identified

from this recording by T. A. Parker. ACL reidentified this recording as pertaining to Black-chested Tyrant *Taeniotriccus andrei*, an identification consistent with the plumage details noted by the Islers (in Zimmer *et al.* (1997), which could apply to either species. The voice of *T. andrei* went undescribed until February 2003, when KJZ made the first definitive sound-recordings in the Serra dos Carajás (Zimmer & Whittaker 2004). *P. capitalis* must be removed from the Alta Floresta list. A male collected at Juína, Mato Grosso, on 24 November 2006 (Universidade Federal de Mato Grosso [UFMT] 1709) becomes the first record for Mato Grosso (Signor *et al.* 2011).

TAWNY-CROWNED PYGMY TYRANT *Euscarthmus meloryphus*

Reported in the first inventory (Zimmer *et al.* 1997) by multiple observers from forest edge and non-forest habitats; however, as the species has not been seen in the last 15 years despite much apparently suitable habitat, we consider it best removed from the main list until supporting documentation becomes available. An archived sound-recording (ML48262) by M. & P. Isler obtained on 2 November 1989, and listed as this species, was reidentified as Yellow Tyrannulet *Capsiempis flaveola* (ACL). The closest records to Alta Floresta are documented by audio recordings from stunted *campinarana* on the rio São Benedito II in southern Pará (BJWD).

Species added since 1997

The 124 species added to the regional avifauna since the publication of Zimmer *et al.* (1997) are treated under six groups based on either their primary habitat association or migratory tendencies. New species were scattered across most non-passerine orders and most passerine families, but more non-passerines than passerines were added. The majority of additions are characteristic of habitats other than 'core' *terra firme* forest, which reflects both the increased attention given to open areas south of the rio Teles Pires and the loss of forest in this region.

Species of terra firme and seasonally flooded forests.—Thirty-five species added to the local avifauna occur predominantly in tall forest (either *terra firme* or seasonally flooded), the principal habitat sampled in the first survey. The distinction between *terra firme* and seasonally flooded forest in this region is not always sharp, and much of the forest at CJL is more accurately considered transitional. Many species occur in both forest types (and all gradations in between), even if showing a preference for one over the other. Many species missed by the first survey are low-density or patchily distributed taxa easily overlooked in all but the most thorough assessments. Examples include Violaceous Quail-Dove *Geotrygon violacea*, Long-tailed Potoo *Nyctibius aethereus*, Banded Antbird *Dichrozona cincta* and Amazonian Scrub Flycatcher *Sublegatus obscurior*. Two others, Kawall's Parrot *Amazona kawalli* and Bald Parrot *Pyrilia aurantiocephala*, are relatively recent discoveries, and were virtually unknown in life during the initial survey, which probably contributed to their being overlooked.

UNDULATED TINAMOU *Crypturellus undulatus*

Although unrecorded prior to mid-September 1997, when found along the rio Cristalino (KJZ, AW), it is fairly common in scrubby, riverine forest along both the rios Teles Pires and Cristalino.

BARE-FACED CURASSOW *Crax fasciolata*

Occurs in small numbers on the right bank of the rio Teles Pires, with several semi-habituated birds frequenting the clearing at CJL. Extremely rare on the left bank of the

Teles Pires, where recorded only by camera-trap surveys (F. Michalski unpubl.). Hunting pressure is probably a limiting factor in the more populated southern half of the region.

WHITE HAWK *Leucopternis albicollis*

Another low-density species most commonly recorded soaring over semi-deciduous forest on the granitic *serras* and less frequently in non-forested areas.

BLACK-FACED HAWK *Leucopternis melanops*

Two documented records at CJL: singles photographed from Tower 1 on 18 August 2005 (Wallace & Petermann 2007) and along the Cacao Trail on 9 June 2010 (J. Montejo & A. McAndrews; Fig. 2). These records support the hypothesis (Amaral *et al.* 2007) that the species is widespread yet overlooked in southern Amazonia, with sympatry now demonstrated as far west as south-east Peru (Shrum *et al.* 2011). Given recent records at CJL, and other documented records from southern Amazonia, we must re-evaluate a 20 August 1991 sighting by KJZ & T. A. Parker of a pair of *Leucopternis* seen counter-calling in forest edge near the Gold Miners' Trail. One was a typical adult White-browed Hawk *L. kuhli*, whereas the other appeared like typical *L. melanops*. Parker & KJZ debated the identity of the second bird, with Parker agreeing that it looked like a Black-faced Hawk (whitish crown, dark mask, pale-spotted mantle), but ultimately persuading KJZ that, in light of what would have been a considerable range extension for *L. melanops*, the bird was perhaps more likely in an undescribed juvenile plumage of *L. kuhli* (Amaral *et al.* 2007). Given current knowledge, KJZ now feels it was indeed *L. melanops*, although apparent south-bank sympatry of two such closely related (and vocally similar) raptors is puzzling.

VIOLACEOUS QUAIL-DOVE *Geotrygon violacea*

The first local record of this species, previously unrecorded in lowland Amazonian Brazil, involved a female seen by AW on 9 November 1996 foraging at close range on the Rochas Trail. Several subsequent reports in June–October, but the only well-documented records involve birds videotaped by KJZ on the Cacao Trail on 18 September 1998 (Fig. 3) and by BJWD at the rio Cristalino on 8 September 2010 (Fig. 4, WA845115). First records for Mato Grosso. Perhaps makes seasonal or nomadic movements similar to Ruddy Quail-Dove *G. montana*, which ranges widely, probably to exploit regional peaks in fruit production (Stouffer & Bierregaard 1997). Elsewhere in Amazonian Brazil, two specimens from Santana do Araguaia, in south-east Pará (14–24 June 1992), one from the Flona do Tapirapé-Aquirí, Serra dos Carajás, July 2009 (MPEG) and one from Prata, near Belém, Pará, 23 June 1903 (Hellmayr 1906).

Field separation of females of *G. violacea* and the more frequent *G. montana* can be challenging. Both sexes of *violacea* are distinctly whitish on the lower breast to undertail-coverts, contrasting sharply with the upper breast, which is pinkish in males and greyish brown with a slight pinkish cast in females. Female *montana* also has a noticeably pale belly, buff or dingy off-white, and the drab brown breast fades into the belly with a less pronounced demarcation. Violaceous Quail-Dove also shows marked contrast between the rufous-brown remiges and drab brown coverts on the folded wing, and between the drab brown back (which, even in females, often has a purplish tinge) and 'warmer' rufous rump, uppertail-coverts and rectrices. In female Ruddy Quail-Dove, the remiges are darker and duller than the coverts, not 'warmer' or more rufescent in tone, and the back, rump, uppertail-coverts and tail are essentially concolorous. Female *G. violacea* tends to have the forehead, supraloral region and chin whitish, whereas these are distinctly buffy in most female *G. montana*. Male Violaceous Quail-Dove is more distinctive, with a paler, greyish-



Figure 2. Black-faced Hawk *Leucopternis melanops*, 9 June 2010 (J. Montejo)

Figure 3. Composite series of videograbs of Violaceous Quail-Dove *Geotrygon violacea*, 18 September 1998 (K. J. Zimmer)

Figure 4. Composite of videograbs of Violaceous Quail-Dove *Geotrygon violacea*, 8 September 2010 (B. Davis)



white head and face, strong violaceous tones to the mantle and rump, a noticeably pinkish breast, and more extensively white belly; it also lacks the bold malar stripe characteristic of many other quail-doves, including *G. montana*.

LONG-TAILED POTOO *Nyctibius aethereus*

The first regional record was one tape-recorded on 1 June 2006 in the forest fragment adjacent to FAH (BJWD, XC116371). It continued to sing until at least mid October and was seen by many observers (e.g., ACL, BMW, S. Mahood & D. Luther). Subsequently, four territories were discovered at CJL (Fig. 5). Outside our region, also in Mato Grosso, one was collected at Querência on 27 July 2010 (S. M. Dantas). First documented state records. Patchily distributed and often at low density, but widespread in southern Amazonia. The closest localities to Alta Floresta are the Serra do Cachimbo in Pará (Pacheco & Olmos 2005), Santarém (Lees *et al.* 2013) and rio Roosevelt in southern Amazonas (Whittaker 2009).

RUFOUS NIGHTJAR *Antrostomus rufus*

Regional status unclear. First recorded on 15 July 2004, when ACL found an incubating bird with two eggs in a forest fragment 20 km south-east of Alta Floresta. Only 2–3 additional records from the vicinity of CJL: one photographed and sound-recorded along the Serra Trail on 26 June 1998 (BMW, W. & G. Carter), one photographed at the base of Tower II on 23 June 2010 (J. Lopes, A. McAndrews) that was possibly the same bird tape-recorded there on 13 August 2010 (AW), and a singing bird near the base of Tower I pre-dawn on 24 August 2012 (BJWD).

SILKY-TAILED NIGHTJAR *Antrostomus sericocaudatus*

First found on 18 September 1996, when one was tape-recorded immediately adjacent to the lodge clearing at CJL (AW, KJZ). No more records until 6 September 2006, when two were singing along a newly cut trail 1.5 km south of the lodge (R. Hoyer, N. Athanas), with individuals subsequently found intermittently at this site. First records for Mato Grosso. Elsewhere in eastern Amazonia, recorded in Pará at Santarém (Griscom & Greenway 1941), Floresta Nacional do Tapajós (Lees *et al.* 2013), Pinkaiti (Aleixo *et al.* 2000) and Carajás (Marantz & Zimmer 2006, Pacheco *et al.* 2007).

AMAZONIAN SWIFT *Chaetura viridipennis*

Status of all swifts confused by identification difficulties. Nevertheless, this species appears to be a fairly common constituent of the large, multi-species flocks of *Chaetura* that occur over the rio Cristalino, and has also been recorded on the left bank of the rio Teles Pires. Amazonian Swift is larger than other *Chaetura* at Alta Floresta. Relative to Grey-rumped Swift *C. cinereiventris*, with which it is probably most likely to be confused locally, *C. viridipennis* is noticeably larger, proportionately longer winged, and flies with stronger, less rapid wingbeats. It also tends to appear less obviously capped, and its rump is browner and less contrastingly pale relative to the back.

LESSER SWALLOW-TAILED SWIFT *Panyptila cayennensis*

A single observed for several minutes over Alta Floresta airport on 5 January 1998 (CAM) was the first local record. A scarce resident around Alta Floresta, in both the extensively forested areas east of the Teles Pires and the fragmented landscape to the west.

CRIMSON TOPAZ *Topaza pella*

First recorded on 27 December 1997, a female flycatching over the rio Cristalino (CAM). All subsequent sightings from the vicinity of the river, where the only consistently occupied territory is near the start of the Serra Trail (B. Carlos pers. comm.). A female photographed and sound-recorded on 23 November 2008 upstream of the Castanheira Trail (M. Reid & BJWD). Much more frequent at the nearby rio São Benedito II in southern Pará, where several territories are known (Davis & Olmstead 2010).

TAPAJÓS HERMIT *Phaethornis aethopyga*

Described as a subspecies of Little Hermit *P. longuemareus* from two specimens collected at Caxiricatuba on the right bank of the lower rio Tapajós (Zimmer 1950). Although *aethopyga* was subsequently dismissed as a hybrid Streak-throated Hermit *P. rupurumii* × Reddish Hermit *P. ruber* (Hinkelmann 1996), specimens matching the type have now been collected from multiple locations in the rio Tapajós drainage, and their morphological distinctiveness leaves no doubt that it represents a valid species (Piacentini *et al.* 2009). First recorded on 19 September 1996, when KJZ & AW observed one or more feeding at a flowering *Inga* along the rio Cristalino just upstream of CJL. Subsequently found to be a low-density inhabitant at several sites on the right bank of the Teles Pires, with a lek near the Castanheira Trail in July 2004 (B. Carlos).

WHITE-BEARDED HERMIT *Phaethornis hispidus*

Presence long suspected, but difficulties in identifying *Phaethornis* meant that it was not confirmed until three were mist-netted along the Taboca Trail in May 2005 (J. Tobias & N. Seddon; Fig. 6). A nest in the 'Bungalow Clearing' at CJL in mid-April 2005 contained two eggs on 5 May and two nestlings on 8 May (F. Lambert, J. Tobias & N. Seddon).

FIERY-TAILED AWLBILL *Avocettula recurvirostris*

An easily overlooked species first recorded in semi-deciduous woodland along a new extension to the Serra Trail on 27–29 October 2005, when a male and female were observed feeding at terrestrial bromeliads (G. Bernadon). A male was at the same site on 17 July 2006 (S. Olmstead & S. Woods) and a female there on 24 July 2006 (ACL & BJWD). Subsequent sightings include a male photographed in stunted, semi-deciduous forest 1 km south of the lodge on 6 August 2007 (R. Hoyer; WA679972), a male in the crown of a low, isolated tree atop the Serra Trail on 11 June 2008 (BMW) a female hawking gnats in the canopy of leafless trees there on 22 June 2010 (BMW), a female at the first rocky summit of the Serra Nova Trail on 12 November 2009 (BJWD), an adult male observed flycatching in the canopy along the lower rio Cristalino on 14 August 2010 (AW) and an adult male photographed on the Serra Trail on 1 August 2011 (M. Lilje). First records for Mato Grosso. Elsewhere in central-south Amazonia, found in Rondônia at Cachoeira Nazaré (Stotz *et al.* 1997); in Pará at Carajás (Pacheco *et al.* 2007), Floresta Nacional do Tapajós (Marantz & Zimmer 2006), Parque Nacional do Amazônia (AW & BMW), Floresta Nacional do Caxiuanã (AW & BMW), Pousada Rio Azul on the rio São Benedito II (BJWD), the rio Guamá at Marituba (ACL, N. Moura) and around Paragominas (Lees *et al.* 2012); in Amazonas along the rio Madeira at Itapinima (Cohn-Haft 2007), at Pousada Rio Roosevelt (AW, BJWD) and near Borba (AW, BMW, G. Kirwan, H. Shirihai).

FESTIVE COQUETTE *Lophornis chalybeus*

The only documented records concern a perched male photographed preening by a treefall gap along the Cacau Trail on 29 September 2005 (R. Hoyer; WA673423) and a female



Figure 5. Long-tailed Potoo *Nyctibius aethereus*, 9 August 2010 (A. Whittaker)

Figure 6. White-bearded Hermit *Phaethornis hispidus*, May 2005 (J. Tobias)

Figure 7. Rusty-breasted Nunlet *Nonnula rubecula*, 31 August 2007 (B. Freeman)

photographed feeding at *Rodriguezia* sp. orchids in the CJL clearing on 5 October 2011 (R. Hoyer; WA673422). Undocumented records include a male and female on the Serra Trail on 18 June 2003 (A. Kirschel), a female at a flowering *Inga* at the FAH clearing on 27 January 2004 (BJWD) and another female on two dates in February 2004 on the Serra Trail (BJWD), with a male there on 1 July 2005 (S. Mahood). Also known from the Serra dos Caiabis, 70

km south of Alta Floresta (Lees *et al.* 2008). Records pertain to Amazonian *L. c. verreauxii* and not the nominate, which is endemic to the Atlantic Forest (and may warrant recognition as a separate species).

GOULD'S JEWELFRONT *Heliodoxa aurescens*

Five documented records. Three during the wet season involved single males photographed feeding at red flowers of terrestrial bromeliads *Bromelia balansae* and *Costus* sp. within the same small patch of semi-deciduous forest surrounded by *terra firme* adjacent to CJL on 24 February 2004, 17 February–5 March 2009 (BJWD; WA559052) and 21 February 2012 (BJWD; WA869951). The two dry-season records involved single males photographed on 6 September 2010 on the Castanheira Trail (E. Ramirez; WA588152) and on 1 August 2012 from Tower II at CJL as it fed at flowers in the canopy (AW). First documented state records. Probably under-recorded and we are aware of several other undocumented records in the wet season, when observer coverage is weakest.

RUFOUS MOTMOT *Baryphthengus martii*

Remarkably scarce. Tape-recorded and seen along the Castanheira Trail on 15 October 1997 (BMW), then seen and recorded next day and on 17–18 November 1997 (CAM; Marantz & Zimmer 2006). This territory is the only one that has been consistently occupied at CJL, yet birds have also been observed on the Rochas and Cacau Trails. First recorded on the left bank of the rio Teles Pires when one was video- and audio-recorded in a large forest fragment 30 km west of Alta Floresta in July 2005 (ACL), but subsequently found at five other widespread forest patches in 2005–06 (e.g. ACL; XC86621).

RUSTY-BREASTED NUNLET *Nonnula rubecula*

An unobtrusive species first recorded when one was videotaped along the Haffer Trail on 26 June 2002 (P. Donahue). Five subsequent sightings, all in forest near the river: a pair along the Tapiri Trail on 7 June 2006 (S. Olmstead), a single along the Manakin Trail on 21 September 2006 (R. Hoyer) with one photographed there on 31 August 2007 (B. Freeman; Fig. 7), one tape-recorded along the Cacau Trail on 30 September 2007 (S. Olmstead) and one photographed on the Taboca Trail on 17 August 2008 (G. Kirwan, W. Price). First records for Mato Grosso, with two subsequently collected at Paranaíta on 4 May and 25 September 2009 (AW). Elsewhere, recorded in southern Pará as close as Thaimaçu on the rio São Benedito on 23 November 2005 and at Pousada Rio Azul on the rio São Benedito II on 9 and 30 September 2009 (BJWD), and in Amazonas at the rio Roosevelt (Whittaker 2009).

BLACK-NECKED ARACARI *Pteroglossus aracari*

Rare to uncommon at CJL, where reported by J. Haffer in November–December 1993. Apparently more abundant further upstream on the rio Cristalino and recently proven to occur regularly at Tower II (BJWD). Unknown on the left bank of the rio Teles Pires. The study region marks the contact zone between Black-necked and Chestnut-eared Aracaris *P. castanotis*, but it is unclear if hybridisation occurs, as may be the case in south-east Amazonia (Haffer 1974). Both species also occur along the rio Peixoto de Azevedo, 100 km east of Alta Floresta (Novaes & Lima 1990).

HYACINTH MACAW *Anodorhynchus hyacinthinus*

An occasional visitor, but regular in the neighbouring Serra do Cachimbo (Buzzetti 2005, Pacheco & Olmos 2005). Most records from the rio Cristalino, where an adult was photographed in mid-July 2008 (J. Lopes). There is a resident population in an area

dominated by *Astrocaryum* palms on the left bank of the rio São Benedito II 70 km north-west of Alta Floresta (BJWD).

BALD PARROT *Pyrilia aurantiocephala*

Recently described and known in the region from just two records: two photographed on 10 October 2005 in young second growth near the forest edge along the road that bisects Parque Estadual Cristalino near Limão c.10 km upstream from CJL (R. Hoyer; Fig. 8), and three photographed with Orange-cheeked Parrots *P. barrabaudi* on 28 August 2008 on Ilha Ariosto (J. Lopes, D. Buzzetti), with one photographed there next day (R. Santos; WA163160). First records for Mato Grosso, a southern extension from the nearest localities in extreme southern Pará on the Serra do Cachimbo at Cachoeiras do Curuá (Pacheco & Olmos 2005), the rio São Benedito at Thaimaçu (Gaban-Lima *et al.* 2002) and rio São Benedito II (BJWD). These are both right-bank tributaries of the middle rio Teles Pires. Given the abundance of *P. barrabaudi* in the study region, and apparent rarity of *P. aurantiocephala*, it is probable that birds in our region are strays from nearby populations.

KAWALL'S PARROT *Amazona kawalli*

Described from captive birds (Grantsau & Camargo 1989), it was not until 1995 that *A. kawalli* was discovered in the wild (Martuscelli & Yamashita 1997). First found on 13 October 1997, the first records for Mato Grosso, when documented by audio recordings made by BMW. Now known to be one of the commonest *Amazona* on the right bank of the rio Teles Pires, but seemingly absent from the left bank, where apparently replaced by Mealy Parrot *A. farinosa*, which is rare on the right bank. The near-total lack of published information on the species prior to the first survey, coupled with its morphological similarity to Mealy Parrot, undoubtedly led to *A. kawalli* being overlooked prior to 1997.

SCARLET-SHOULDERED PARROTLET *Touit huetii*

Appears uncommon in *terra firme* forest, where most often detected by voice as singles or small groups pass high over the forest canopy. It is unclear if *T. huetii* undertakes local movements in response to seasonal changes in food resources across the region.

BANDED ANTBIRD *Dichrozona cincta*

A singing bird on the Cajá Trail on 11–12 July 2002 (P. Donahue) was the only record until June 2005, when what may have been the same individual was found in the same spot (D. Luther) and subsequently seen and recorded by many observers until at least August 2010 (e.g., Marantz & Zimmer 2006). Another singing bird was on the left bank of the rio Cristalino near Tower II on 6 October 2009 (BJWD & J. Lopes). First documented state records. Here, at the southern edge of its range, apparently at very low density, whereas the species is a more conspicuous inhabitant of *terra firme* forest in western Amazonia and, at least locally, east of the rio Xingu (CAM, KJZ & ACL). Also known in eastern Amazonia in Pará at the Floresta Nacional de Caxiuanã (Silva 1998, Marantz & Zimmer 2006), on the right bank of the rio Xingu at Pinkaiti (Aleixo *et al.* 2000), Trairão (Pacheco & Olmos 2005), the Floresta Nacional do Tapajós (Henriques *et al.* 2003), Parque Nacional da Amazônia (AW) and Serra dos Carajás (Pacheco *et al.* 2007).

CINNAMON-RUMPED FOLIAGE-GLEANER *Philydor pyrrhodes*

The first record concerned two (MPEG 51438–439) collected on the Haffer Trail on 22 and 27 November 1993 (J. Haffer), with unseen birds heard along the Rochas Trail on 15–18 October 1997 and Serra Trail on 3 November 1997 (CAM), and one was recorded



Figure 8. Bald Parrot *Pyrilia aurantiocephala*, 10 October 2006 (R. Hoyer)

Figure 9. Slender-billed Xenops *Xenops tenuirostris*, 23 November 2008 (M. Reid)

Figure 10. Amazonian Scrub Flycatcher *Sublegatus obscurior*, 19 September 2011 (R. Hoyer)

Figure 11. Black-faced Tanager *Schistochlamys melauopis*, 22 October 2011 (M. Matthiessen)

Figure 12. Paint-billed Crake *Neocrex erythropus*, 27 August 2012 (W. Chambers)

singing and subsequently seen on 15 September 1998 at the Taboca Trail (KJZ, AW). Scarce inhabitant of riparian forests, particularly those dominated by palms.

SLENDER-BILLED XENOPS *Xenops tenuirostris*

Given that Streaked Xenops *X. rutilans* is apparently restricted to semi-deciduous forests atop serras, it is probable that the account in the original survey of *X. tenuirostris* / *rutilans* from the left bank of the rio Teles Pires indeed involved Slender-billed Xenops, which was first recorded definitively on 10 November 1997, when one was seen in the canopy of *igapó* forest near the start of the Haffer Trail (CAM). Documentation is provided by a sound-recording obtained by BMW on 8 October 1999 (ML108748) and photographs by M. Reid on 23 November 2008 (Fig. 9) of a Slender-billed Xenops with a mixed-species flock at the CJL clearing. A scarce and often overlooked resident, principally in seasonally flooded forest along the rio Cristalino.

WHITE-CHINNED WOODCREEPER *Dendrocincla merula*

A relatively common inhabitant of *terra firme* forest accidentally omitted from the original list.

AMAZONIAN SCRUB FLYCATCHER *Sublegatus obscurior*

An inconspicuous flycatcher of the canopy and subcanopy of tall forest, usually at light gaps and edges. First recorded at Tower I on 3 July 1999 (BMW), followed by observations by AW from Tower I on 5 May 2003 and in August 2004, and on the left bank of the rio Teles Pires at Fazenda Cristalino on 17 June 2004 (BMW). ACL sound-recorded one at the edge of *terra firme* forest 30 km south-west of Alta Floresta on 13 September 2005 (XC115822). BMW has subsequently tape-recorded or videotaped at least one almost annually since 2005, and along most of the trail system at CJL. The only photograph was taken at Limão on 19 September 2006 (R. Hoyer; Fig. 10). First documented state records.

BLACK-CHESTED TYRANT *Taeniotriccus andrei*

Added to the Alta Floresta list on the basis of the reidentified tape-recording (ML48203) of a female seen by M. & P. Isler along the Gold Miners' Trail on 7 November 1989 (ACL: see Black-and-white Tody-Flycatcher). This is the first record of *T. andrei* for Mato Grosso. Black-chested Tyrant has recently been discovered in the adjacent municipality of Paranaíta, where Signor *et al.* (2011) collected a male at 09°24'S, 57°06'W on 27 April 2008. M. Pérsio & AW subsequently tape-recorded and collected specimens 80 km north-east of Alta Floresta in September 2009. We anticipate the species' future rediscovery around Alta Floresta.

YELLOW-MARGINED FLYCATCHER *Tolmomyias assimilis*

An audio recording made along the Gold Miners' Trail on 17 September 1993 (KJZ) was the first documentation of this species' occurrence in the region, but the recording was not identified until after the final submission of Zimmer *et al.* (1997). Based on its voice, this flycatcher is a relatively plentiful and vocal member of mixed-species canopy flocks in the region. Populations in south-east Amazonia (*T. a. paraensis*), including Alta Floresta, are very different vocally from the *T. assimilis* complex in western Amazonia, the Guianas and Central America, which are the subject of ongoing investigation by KJZ, AW & BMW. The contact zone between *T. a. paraensis* and *T. a. assimilis* lies in the municipality of Alta Floresta, given that *T. a. assimilis* has been recorded immediately south of the region at Serra dos Caiabis (Lees *et al.* 2008).

CINNAMON NEOPIPO *Neopipo cinnamomea*

The only documented records concern one tape-recorded on the Castanheira Trail on 20 June 2004 (BMW) and a singing bird filmed by B. Carlos on 5 November 2012 on the Serra Trail, with several undocumented reports from elsewhere at CJL. No records from the left bank of the rio Teles Pires, but encountered frequently in white-sand forest to the south at Serra dos Caiabis (Lees *et al.* 2008) and to the north on Serra do Cachimbo (Pacheco & Olmos 2005).

WHITE-CROWNED MANAKIN *Dixiphia pipra*

Apparently one of the scarcest manakins in the region, it was first recorded at the Haffer Trail on 17 November–9 December 1993, when nine specimens were collected by J. Haffer. Subsequently three leks have been discovered: one along the rio Cristalino 1 km south of CJL, another on the right bank of the rio Cristalino upstream of the Castanheira Trail, and on the left bank of the rio Teles Pires along the Borboletas Trail (ACL & BJWD). Singles, typically in female-like plumage, are found sporadically elsewhere (including one banded adjacent to the Saleiro along the Rochas Trail on 29 May 2005 by ACL). First documented state records.

BLACK-NECKED RED COTINGA *Phoenicircus nigricollis*

'*Phoenicircus* sp.' appeared on the original list based on an unidentified bird heard in the canopy of dense forest at the Gold Miners' Trail on 25 August 1991 (T. A. Parker & KJZ) and another heard and glimpsed at a fruiting tree along the Rochas Trail on 21 October 1992 (KJZ & B. Schram). On 4 August 2012 AW tape-recorded the song and briefly saw an unsexed *P. nigricollis* below Tower I and at the Saleiro. Closest records from the right bank of the rio Teles Pires just upstream from the mouth of the rio São Benedito, 130 km from Alta Floresta, where a female was collected on 24 June 1999 (J. Weckstein; MPEG 54729).

DOTTED TANAGER *Tangara varia*

This enigmatic tanager was first reported when a single was seen on 26 September 2008 on the 'Manakin Trail' (B. Freeman). It was observed feeding for c.10 seconds at 20 m distance on a low (4 m-high) melastome with other *Tangara* tanagers, dacnises and manakins. BMW sound-recorded and subsequently saw one from the upper platform of Tower II on the left bank of the rio Cristalino on 22 June 2011, and AW observed a male in the same place feeding on berries in the canopy on 27 June 2012 and heard an additional bird on the Serra Trail by the river on 29 June 2012. Confirmation of this species' presence in the study area was anticipated, given that it is known from the Serra do Cachimbo immediately to the north (AW) and Serra dos Caiabis to the south (Lees *et al.* 2008).

BUFF-RUMPED WARBLER *Phaeothlypis fulvicauda*

The first records involved a territorial pair at a stream in *terra firme* forest 30 km west of Alta Floresta in July 2005 (ACL; XC115824) and a pair seen and sound-recorded in similar habitat 39 km west-southwest of Alta Floresta in August 2005 (ACL). Also occurs on the Serra dos Caiabis south of Alta Floresta (Lees *et al.* 2008), but unknown on the right bank of the rio Teles Pires, where replaced by Riverbank Warbler *P. rivularis*. The two sites where Buff-rumped Warblers were recorded were the westernmost of 37 riparian sites surveyed in 2005, so the species may reach the limits of its distribution in the west of the region. These sightings suggest that the contact zone between dark-rumped *P. rivularis* and bright-rumped *P. fulvicauda* lies at or at least near the rio Teles Pires.

Semi-deciduous forest species.—Six species reported for the first time since 1995 have been in either semi-deciduous, xerophytic woodland atop rocky *serras*, or in patches of stunted forest within tall, evergreen forest. Only a few hundred metres of trails traverse these habitats at CJL and semi-deciduous forests remain unsampled on the left bank of the rio Teles Pires. These small habitat islands host a depauperate avifauna different from that in adjacent evergreen forest. Analysis of Landsat images indicates the presence of *campinarana*-type forests upstream along the rio Cristalino, at the extreme southern edge of the Serra do Cachimbo, and in our region. The avifauna at these sites is probably similar to that at the Serra do Cachimbo to the north in southern Pará (Pinto & Camargo 1957, Pacheco & Olmos 2005) and the Serra dos Caiabis to the south in Mato Grosso (Lees *et al.* 2008). Several other species of transitional forest habitats have recently been reported from the region, albeit without documentation. We anticipate that their presence will be confirmed in future and speculate that the occurrence of several species during major drought events may be more than coincidental. Populations of many *terra firme* forest species may also have been locally reduced, even within continuous forest, a trend that, if proven, may be tied to recent anomalies and shifts in rainfall regimes, such as those discussed by Spracklen *et al.* (2012).

SCALED PIGEON *Patagioenas speciosa*

First recorded on 21 September 1997 when one was seen from atop the Serra Trail (AW). *P. speciosa* is now an uncommon resident most frequently found in semi-deciduous forests atop the *serras* or along rivers.

SPOTTED PUFFBIRD *Bucco tamatia*

Initially found on 17 September 1998, when a territory was discovered on the Serra Trail (KJZ & AW, KJZ audio recording), and this territory remained occupied through July 2012 (BJWD). BMW has also seen and heard individuals on both banks of the rio Cristalino just above the head of the Serra Trail. BJWD found at least three on the first rocky summit of the Serra Nova Trail in November 2011, where the species was photographed on 18 July 2012 by E. Ramirez (WA708138).

BLUE-WINGED MACAW *Primolius maracana*

This Near Threatened species is scarce in the region. The first record involved a pair heard and seen over the rio Cristalino near the Haffer Trail on 20 October 1996 (BMW). Recorded most frequently in semi-deciduous forest along the rio Cristalino, but also fairly regularly in agricultural landscapes south of the rio Teles Pires, particularly in and near Alta Floresta, where apparently increasing (BJWD). May be colonising the region from source populations on the Serra do Cachimbo (Pacheco & Olmos 2005) or Serra dos Caiabis (Lees *et al.* 2008).

YELLOW-BROWED ANTBIRD *Hypocnemis hypoxantha*

Known from a single territory along the Serra Trail found on 9 June 2004 (BMW) and occupied at least through June 2009 (BMW). First record for Mato Grosso. Elsewhere in south-central Amazonia, the distinctive *H. l. ochraceiventris* is known from southern Pará, in the Floresta Nacional do Tapajós (Marantz & Zimmer 2006), the rio São Benedito II (BJWD), rio São Benedito (BMW; J. Minns & A. Grosset *in litt.* 2003) and Altamira on the rio Xingu (Griscom & Greenway 1941). Additionally, BMW *et al.* are describing a new species in the *H. hypoxantha* complex from the left bank of the Tapajós / Juruena.

BLACK-FACED TANAGER *Schistochlamys melanopis*

Single adult photographed by T. Brooks & M. Matthiessen on the summit of the Serra Trail on 22 October 2011 (Fig. 11). Occurs in transitional forest north and south of the region on the Serra do Cachimbo (Pacheco & Olmos 2005) and Serra dos Caiabis (Lees *et al.* 2008), respectively.

RED-LEGGED HONEYCREEPER *Cyanerpes cyaneus*

Following a report from the summit of the Serra Trail on 6 July 2012 (E. Patrial), BJWD observed an adult and subadult male accompanying a mixed-species flock including Purple C. *caeruleus* and Short-billed Honeycreepers *C. nitidus*, and various *Tangara* spp. in the canopy of *terra firme* forest at Tower II on 22 August 2012. Occurs on the Serra do Cachimbo immediately north of Alta Floresta (Pacheco & Olmos 2005).

Scrub, young second-growth, and non-forest species.—Seventy million hectares of Amazonia have been converted into anthropogenic habitats, resulting in massive floral and faunal impoverishment (Laurance *et al.* 2004). Filling this vacuum is a predictable subset of edge and non-forest species, the community structure of which was described by Mahood *et al.* (2012). Thirty-two such species were recorded for the first time in Alta Floresta since 1997. In the previous study (Zimmer *et al.* 1997), non-forest habitats were poorly sampled, so many of these species were probably overlooked; however, others probably represent recent colonists following the continued loss of forest, and it seems certain that even more open-country species will invade in the future. Expected species include Eared Dove *Zenaida auriculata*, White-eared Puffbird *Nystalus chacuru*, Spot-backed Puffbird *Nystalus maculatus* and Peach-fronted Parakeet *Aratinga aurea*, all of which occur in degraded habitats not far to the south in the Serra dos Caiabis (Lees *et al.* 2008). Cattle Tyrant *Machetornis rixosus* also seems overdue given its widespread distribution in open habitats.

SPECKLED CHACHALACA *Ortalis guttata*

First recorded on 27 November 1997, when one was seen in scrub on Ilha Ariosto, a large river island in the rio Teles Pires (CAM). Chachalacas also occur in *igapó* forest at Lagoa Cigana, but are rare on the left bank of the rio Teles Pires (although this may reflect poor sampling of river-edge habitats). Encountered several times near the Porto de Areia river crossing downstream of the mouth of the rio Cristalino (BJWD) and in scrub between there and the town of Alta Floresta (BMW & S. Mahood).

TURKEY VULTURE *Cathartes aura*

First recorded on 31 December 1997 just outside Alta Floresta along the road to the rio Teles Pires (CAM), yet it is now a common inhabitant of farmland and over urban areas on the south side of the river.

WHITE-TAILED KITE *Elanus leucurus*

Although first noted behind FAH on 2 December 1997 (CAM), it is now a fairly conspicuous inhabitant of farmland on both sides of the rio Teles Pires.

GREY-LINED HAWK *Buteo nitidus*

Unrecorded until 18 September 2001, when one was seen between Alta Floresta and the rio Teles Pires (S. Hansson), Grey-lined Hawk is now conspicuous away from continuous forest, where it appears to prefer small forest patches bordering unmanaged pasture and scrub.

RUSSET-CROWNED CRAKE *Anurolimnas viridis*

First recorded on 17 September 1996, when a pair was tape-recorded and seen between Alta Floresta and the rio Teles Pires (KJZ, AW), but now a common inhabitant of non-forest habitats, particularly cattle pastures and scrub, often far from water (Mahood *et al.* 2012).

SCALED DOVE *Columbina squammata*

A bird photographed 20 km west-northwest of Alta Floresta on 12 May 2005 (ACL; WA839394) was the first record. Seen only sporadically in 2005–06, when recorded on just 0.5% of point counts in non-forested habitats (Mahood *et al.* 2012), yet is now increasing rapidly (BJWD).

PICAZURO PIGEON *Patagioenas picazuro*

Since the first record—two on 4 November 1997 between Alta Floresta and the rio Teles Pires (CAM)—has become a fairly common inhabitant of open country. Detected on 16% of surveys in non-forested habitats around Alta Floresta (Mahood *et al.* 2012).

WHITE-TIPPED DOVE *Leptotila verreauxi*

Apparently unrecorded prior to a report on 9 August 2001 along the road between FAH and the Teles Pires (S. Hansson), but now a fairly common resident in agricultural and suburban areas, evidently replacing Grey-fronted Dove *L. rufaxilla*, which is primarily associated with forest and forest edges.

STRIPED CUCKOO *Tapera naevia*

First recorded on 10–24 December 1997 at Fazenda Cristalino (CAM), and subsequently found to be an uncommon resident of non-forested habitats on both banks of the Teles Pires. Occurs principally in tall pasture with some arborescent vegetation, and in scrub on Ilha Ariosto.

GUIRA CUCKOO *Guira guira*

First reported on 19 September 2001 (S. Hansson), it has subsequently become one of the most conspicuous inhabitants of farmland around Alta Floresta.

TROPICAL SCREECH OWL *Megascops choliba*

Although recorded only as recently as 2005, when one was found 12 km south-east of Alta Floresta on 15 June (ACL; XC86649) and another photographed 9 km south-west of Alta Floresta on 23 June (ACL; WA559376), the species has proven to be widespread in farmland and edge habitats, and occurs in urban Alta Floresta (BJWD).

STRIPED OWL *Pseudoscops clamator*

First recorded in the CJL clearing, where one was observed on 11 December 2003 (M. Shirley). Subsequently found at four farmland sites in 2005 (ACL), and breeding was confirmed on 28 September 2008, when a dependent juvenile was photographed in degraded forest adjacent to the airport (BJWD; WA561761). Since found at low density on cattle ranches near Pousada Rio Azul, 70 km north of Alta Floresta (BJWD), suggesting that its range continues to expand with deforestation.

COMMON POTOO *Nyctibius griseus*

The most frequently encountered *Nyctibius* in the region, where it is a fairly common in forest edge bordering rivers and non-forested areas. ACL was shown two nests on 15 July

2005, both atop fence posts amid pastures >1 km from the nearest forest 10 km north of Carlinda (ACL; WA350115).

NACUNDA NIGHTHAWK *Chordeiles nacunda*

Scarce, but potentially increasing, in open country on the left bank of the rio Teles Pires. Records span the period April–October, with the earliest on 26 April 2012 (BJWD; WA625866) and a max. count of 40 on 20 August 2006 roosting at the airport in Alta Floresta (ACL).

WHITE WOODPECKER *Melanerpes candidus*

Recent colonist; the first record was an individual videotaped 35 km north-west of Alta Floresta on 27 May 2006 (S. Mahood), followed by a foraging party of three in the town of Alta Floresta on 5 May 2009 (BJWD), and a single at the same location on 31 October 2010 (BJWD). At least one family group of at least four individuals has become resident in an area of pastures with scattered snags and Brazilnut *Bertholletia excelsa* trees on the east side of Alta Floresta (BJWD). Also known from the Serra dos Caiabis, 60 km south of the region (Lees *et al.* 2008).

APLOMADO FALCON *Falco femoralis*

Just three records: one at FAH on 27 July 2003 (A. Kirschel), a pair photographed 15 km west of Alta Floresta on 13 June 2004 (ACL) that remained through June 2005 (ACL; WA559382) and one 10 km south-east of Alta Floresta on 16 April 2006 (S. Mahood).

BARRED ANTSHRIKE *Thamnophilus doliatus*

First found on 21 April 2004, when a female was observed on Ilha Ariosto (F. Lambert & J. Tobias), but it has subsequently proven to be quite common in scrubby second growth and unmanaged pasture on the left bank of the rio Teles Pires (ACL).

PALE-BREASTED SPINETAIL *Synallaxis albescens*

Although this open-country spinetail went unrecorded until 10 June 2006, when discovered in pastures 3 km east of Alta Floresta (BJWD & ACL), it has subsequently been proven to be an uncommon resident in non-forested habitats, preferring unmanaged pasture with some scrub.

RUSTY-FRONTED TODY-FLYCATCHER *Poecilatriccus latirostris*

Fairly common in habitats similar to those frequented by Barred Antshrike and was mistakenly omitted from Zimmer *et al.* (1997). First record came from 20 km north of Alta Floresta on 27 October 1989 (P. Isler; ML48005). Currently known in the study area only from the left bank of the rio Teles Pires; however, it has also been found north of the river in second growth 65 km north of Alta Floresta (BJWD).

YELLOWISH PIPIT *Anthus lutescens*

First detected on 20 August 2002, when one was in a pasture 35 km north of Alta Floresta (B. Carlos). Subsequent searches have revealed it to be locally plentiful, but patchily distributed, in short-grass pasture.

WHITE-LINED TANAGER *Tachyphonus rufus*

First found when a male was seen on 28 November 1997 on Ilha Ariosto (CAM). Uncommon locally, being most frequently recorded around FAH.

RUFIOUS-COLLARED SPARROW *Zonotrichia capensis*

Fairly common in farmland and urban areas on the left bank of the rio Teles Pires, but also appears sporadically in forest clearings and on the serra north of the Teles Pires.

GRASSLAND SPARROW *Ammodramus humeralis*

First discovered on 21 July 2003, when a singing bird was on the airfield at Alta Floresta (A. Kirschel). Found at seven sites in 2004 (ACL) and subsequently detected on 20% of 397 point counts during surveys of non-forested habitats (Mahood *et al.* 2012).

RUSTY-COLLARED SEEDEATER *Sporophila collaris*

A single male photographed (D. Lorin; WA649377) and sound-recorded at the northern edge of the town of Alta Floresta on 19 May 2012. Prior to this, ACL photographed two captives (a female/immature and an immature male) on 4 August 2005 said to have been obtained 15 km north-west of Alta Floresta.

YELLOW-BELLIED SEEDEATER *Sporophila nigricollis*

Following the first record, a male in the bungalow clearing at CJL on 30 October 1997 (CAM), this *Sporophila* has become common in farmland and forest edge. Often in mixed flocks with Lined Seedeater, but unlike *S. lineola*, which is only a migrant in the region, *S. nigricollis* is also a local breeder during the austral winter.

CHESTNUT-BELLIED SEEDEATER *Sporophila castaneiventris*

Three records, all males in August–September: on 13 September 2004 on Ilha Ariosto (M. Pretti), with a large flock of *Sporophila* in fields adjacent to FAH on 24 September 2005 (ACL), and a captive male photographed at a fazenda 15 km north-west of Alta Floresta on 4 August 2005 (ACL). The latter was reportedly trapped the previous week, and a large *Sporophila* flock was still present during ACL's visit.

RED-CRESTED FINCH *Coryphospingus cucullatus*

Two at the edge of semi-deciduous forest atop the large, granitic dome at the end of the Serra Nova Trail on 12 November 2009 (BJWD) was the first local record. The species' presence was not entirely unexpected given that it was found on the Serra dos Caiabis (Lees *et al.* 2008) and photographed at Salto Apiacás (on the municipal border of Alta Floresta and Juaraá) on 20 May 2009 (BJWD).

GREYISH SALTATOR *Saltator coerulescens*

An uncommon resident of river islands and non-forested areas on both banks of the rio Teles Pires; first detected on 4 November 1997 at Lagoa Cigana (CAM).

CHOPI BLACKBIRD *Gnorimopsar chopi*

One tape-recorded as it flew over FAH on 29 July 2003 (AW) is the only record.

SHINY COWBIRD *Molothrus bonariensis*

A recent arrival, first found on 27 September 2005, when at least six were foraging with Giant Cowbirds *Molothrus oryzivorus* and other icterids 35 km south of Alta Floresta (ACL). Small numbers are now present around the town and at fishponds immediately to the west, where up to 20 were seen in August 2006 (ACL; WA563033).

RED-BREASTED BLACKBIRD *Sturnella militaris*

First recorded locally on 15 May 2005 when two displaying males were at a lake 3 km north-west of Alta Floresta (ACL; WA839393). Subsequently recorded at an additional 15 sites, May–October 2005 and April–September 2006, with recently fledged juveniles at two sites in July 2005 (ACL, S. Mahood). All singing birds chose artificial wetland sites, invariably <100-ha lakes within cattle ranches. Also recorded in May 2005 150 km west of Alta Floresta at Nova Bandeirantes (ACL), 70 km north of Alta Floresta near the rio São Benedito II (BJWD), and west of Alta Floresta in the municipalities of Paranaíta and Apiacás (BJWD).

PURPLE-THROATED EUPHONIA *Euphonia chlorotica*

First recorded on Ilha Ariosto, when a singing male was seen briefly on 28 November 1997 (CAM), and it is now an uncommon inhabitant of edge habitats and semi-deciduous forest throughout the region.

Wetland and river-edge species.—Wetlands were poorly sampled during the first survey. Natural wetlands are restricted to rivers and perennial streams, palm swamps and small oxbow lakes. In this list, we include species associated with sandbars and beaches along rivers (shorebirds, terns) and waterbirds associated with forested river edges (forest-dependant herons and rails). Although no large, natural lakes exist in the region, the damming of numerous small streams and rivers to create waterholes for livestock and piscicultural ventures has provided a patchwork of artificial wetlands up to 100 ha in size throughout the deforested landscape. Some newly recorded species, e.g. Hoatzin *Opisthocomus hoazin* and Black-collared Hawk *Busarellus nigricollis*, are locally common upriver along the rio Cristalino, and at other sites with similar *igapó* / *várzea* habitats. Other species, such as Boat-billed *Cochlearius cochlearius* and Zigzag Herons *Zebrilus undulatus* are easily missed because of their nocturnal or crepuscular habits, respectively. This is particularly true of *Z. undulatus*, which is vocal only seasonally and can be extremely difficult to locate at other times. Some wetland species exhibit some degree of seasonality in their occurrence, such as Jabiru *Jabiru mycteria*, which typically appears in July–August, whereas others, e.g. Least Grebe *Tachybaptus dominicus*, occur erratically, but apparently year-round. Further sampling is required to elucidate the local status of most wetland species.

WHITE-FACED WHISTLING DUCK *Dendrocygna viduata*

The more plentiful of the two *Dendrocygna* in the region, with flocks of up to 300 at larger lakes and fishponds. Numbers peak in August–September when water levels in natural wetland areas are at their lowest.

BLACK-BELLIED WHISTLING DUCK *Dendrocygna autumnalis*

First recorded on 9 December 1997, when two were seen and tape-recorded in the swamp behind FAH (CAM; ML89005). Small numbers are now recorded in association with the generally more plentiful *D. viduata*.

MASKED DUCK *Nomonyx dominicus*

Recorded only three times: one at a small lake 10 km north-west of Alta Floresta on 20 October 1999 (B. Carlos & P. O'Neil), a female-plumaged bird photographed at a perennial wetland 7 km south-west of Alta Floresta on 3 July 2004 (ACL, S. Mahood; WA350079) and another female-plumaged bird photographed at a lake in the town on 20 May 2009 (BJWD).

LEAST GREBE *Tachybaptus dominicus*

Recorded annually in small numbers at Alta Floresta, chiefly in March–June. Nearby, along the rio São Benedito II, it is resident on small pools on cattle ranches, but breeding is unproven (BJWD).

AGAMI HERON *Agamia agami*

Recorded primarily along the rio Cristalino, most frequently upriver in *igapó* and particularly around the oxbow lakes of Lagoa Cigana. Six to eight seen, all at or above Lagoa Cigana, during a two-day trip upstream along the rio Cristalino, 19–20 November 1997 (CAM), was the highest count. An immature at the artificial wetland behind FAH on 2 December 1997 (CAM) is the only record south of the rio Teles Pires.

BOAT-BILLED HERON *Cochlearius cochlearius*

Apparently a scarce resident in suitable riverine habitat on both banks of the Teles Pires, but a paucity of nocturnal surveys (particularly along rivers) result in its remaining poorly known in the region. Almost all records in the dry season, but this may reflect the relative ease of finding the species when water levels are low, because during the wet season there are no exposed fishing perches viewable from easily navigable sections of the river.

ZIGZAG HERON *Zebrilus undulatus*

An adult along the Taboca Trail on 16 September 1997 (AW) was the first record in the region. Subsequently documented breeding along the rio Cristalino, with males vocalising at dusk and before dawn in late October–early April. A nest found on 4 April 2003 was c.1 m above the water surface in a partially submerged shrub (ACL, J. Minns & A. Grosset). Other nests on 28 November 2003 (AW), in late March 2004 (J. Lopes) and on 10 April 2005 (S. Mahood). Only one record from the left bank of the rio Teles Pires, a single foraging in a dense riverside thicket at the rio Santa Helena on 20 July 2005 (ACL). Elsewhere in the region has been collected along the rio Peixoto de Azevedo (Novaes & Lima 1990).

LEAST BITTERN *Ixobrychus exilis*.

ACL flushed a male at close range (affording views of the bird's unstreaked black mantle and remiges) at a perennial wetland 40 km west of Alta Floresta on 15 September 2004. Another observed at close range at Lagoa Cigana on 9 August 2010 (S. Boddington, J. Lopes).

JABIRU *Jabiru mycteria*

Encountered annually, usually alone or in pairs, at perennial wetlands and fishponds on the left bank of the rio Teles Pires in May–October. Breeding was confirmed when a nest with four chicks was photographed on 13 August 2010 1 km north of the rio Teles Pires near the Porto de Areia ferry 28 km north of Alta Floresta (BJWD; WA569675). The nest was in the primary fork (c.25 m above ground) of an isolated, 40 m-tall *Bertholletia excelsa* in a cattle pasture beside a road.

MAGUARI STORK *Ciconia maguari*

The only record was an adult photographed in a field 4 km south of the rio Teles Pires, 35 km north-west of Alta Floresta, on 14 July 2009 (BJWD; WA568849). After being flushed, the bird circled on a thermal to soar with a juvenile Wood Stork *Mycteria americana* and several Black Vultures *Coragyps atratus*. Borrow ponds in *várzeas* of the Teles Pires are frequented

by *M. americana* during the dry season, and it is possible that this bird arrived in the area together with migrants of that species.

BLACK-COLLARED HAWK *Busarellus nigricollis*

Low-density inhabitant of major river systems in the region, on the rios Teles Pires, Cristalino, Santa Helena, and Ribeirão Carmindo.

SLATE-COLOURED HAWK *Buteogallus schistaceus*

Documented for the first time in July 2012, when D. Hofmann photographed one along the rio São João on 9 July, and BJWD & L. Rondini photographed another at a forest corridor near the rio Santa Helena (south of the rio Teles Pires), 30 km due west of Alta Floresta on 14 July (WA694726).

UNIFORM CRAKE *Amaurolimnas concolor*

One photographed foraging on muddy edges of the right bank of the rio Cristalino upstream from the Serra Trail on 8 September 2010 (J. Davis) was later filmed foraging in the open at the water's edge (BJWD; WA844383). The first state record, it was remarkably tame, allowing a boat to approach to within 5 m.

PAINT-BILLED CRAKE *Neorex erythrops*

Recorded twice; a corpse in the bungalow clearing at CJL on 23 October 1997 (identification confirmed by CAM) and an adult photographed along the rio Cristalino on 27 August 2012 (BJWD & W. Chambers; Fig. 12). Elsewhere in southern Amazonia, known in Mato Grosso from São Vicente (Naumburg 1930), and in Pará at the Serra do Cachimbo (Pinto & Camargo 1957), Paragominas (Lees *et al.* 2012), rio Xingu (Sick 1993), rio Jamaxim (Snethlage 1914) and Santarém (Lees *et al.* 2013). No concrete evidence of regular movements, but the many extralimital records suggest either migration or vagrant tendencies (Taylor & van Perlo 1998).

COMMON GALLINULE *Gallinula galeata*

Unrecorded until 24 December 1997, when one was at a pond between Alta Floresta and the rio Teles Pires (CAM), it is now a scarce resident at perennial wetlands. Reported most frequently around FAH and between Alta Floresta and the Teles Pires.

BLACK-NECKED STILT *Himantopus mexicanus*

One record, a pair of adults at fishponds 1 km south of Alta Floresta on 15 June 2004 (ACL).

HOATZIN *Opisthocomus hoazin*

Confined to *várzea* / *igapó*, conspicuous upriver on the rio Cristalino above Limão, with dispersing birds occasionally encountered elsewhere along the rios Cristalino, Teles Pires (e.g., Ilha Ariosto) and Santa Helena (ACL, CAM).

GREEN-TAILED GOLDENTHROAT *Polytmus theresiae*

The first record was a single on Ilha Ariosto in mid-August 2005 (B. Carlos, R. S. Ridgely). Two singing birds on rocky islets adjacent to Ilha Ariosto on 22 August 2012 and on 27 August when sound-recordings were made (BJWD; XC116039). Also recorded just outside our area at Fazenda Madeseik c.50 km north of Alta Floresta (where resident at a large swamp dominated by dead *Mauritia flexuosa* palm snags; BJWD), in low *campinarana* near the rio São Benedito II 70 km north of Alta Floresta, and upriver along the rio Cristalino in

the Reserva Biológica Nascentes do Cachimbo (Buzzetti 2005). The southernmost published records are from white-sand forest on the Serra dos Caiabis (Lees *et al.* 2008), but one was photographed at Campos do Julio, 570 south-west of Alta Floresta (D. Mota; WA663952), with sight records from São José do Rio Claro, 410 km south of Alta Floresta (BJWD, F. F. Oliveira).

AMAZONIAN TYRANNULET *Inezia subflava*

Found in the study area on 13 October 1996 on a small river island adjacent to Ilha Ariosto (BMW). Subsequently found to occupy various small islands along the rio Teles Pires, but unknown from the blackwater rio Cristalino. Also recorded south of the basin in the state of Tocantins along the rio Araguaia near Caseara (KJZ & AW) and the rio Formoso near Lagoa da Confusão (BMW), and in Mato Grosso along the rio Araguaia, rio das Mortes at São Félix do Araguaia (BJWD & AW), the rio Guaporé, and rio Verde downstream of Vila Bela da Santíssima Trindade (BJWD).

BLACK-COLLARED SWALLOW *Pygochelidon melanoleuca*

Apparently a recent colonist. Following an undocumented report in mid-June 2005 on Ilha Ariosto (L. Navarette), there was a flurry of sightings in 2006, including one along the rio Cristalino near CJL on 2 May (S. Mahood), a single over the mouth of the Cristalino on 18 June (BMW), one over rapids in the rio Teles Pires on 11 October (R. Hoyer) and another there on 19 October (M. Van Biers). Observed more frequently in recent years and breeding confirmed on a rocky island in the Teles Pires in August–September 2011 (R. Hoyer; WA673420). Just east of our region, flocks of several dozen were seen 11–12 September 2010 frequenting rocky rapids in the Teles Pires in the municipality of Carlinda, 47 km east of Alta Floresta (BJWD). Closest known site in Mato Grosso is the rio Aripuanã in the west of the state (Novaes 1976).

MASKED YELLOWTHROAT *Geothlypis acuinotialis*

The only local records involved a singing male at a permanent wetland in the town of Alta Floresta on 3–8 July 2009, and a pair at a permanent wetland 4 km east of Alta Floresta on 13 February 2010 (both BJWD). Also, November–February records in dry cattle pastures near the rio São Benedito II in southern Pará (BJWD).

Austral and intratropical migrants.—The extent and nature of austral migration in South America is poorly understood because many species migrate north and ‘disappear’ into Amazonia between April and October (Chesser 1994, Jahn *et al.* 2004, Alves 2007). These birds often are not particularly vocal, tend to occupy marginal habitats, and occur at low densities, so we have a poor understanding of their spatiotemporal distribution across the Amazon basin. Thirty-two species of austral migrants have been recorded from the region, of which 16 were added since Zimmer *et al.* (1997). Many of these are partial or leapfrog migrants, with resident populations augmented seasonally by migrant individuals from southern populations that either winter sympatrically, or which continue further north. In many cases, these migrants represent different subspecies, some of which can be identified in the field. In Grey-breasted Martin *Progne chalybea*, for example, the nominate subspecies is a common resident at Alta Floresta that can be separated from the distinctive, white-bellied *P. c. domestica*, which occurs locally in May–September, and which has been collected elsewhere in eastern Amazonia (Griscom & Greenway 1941), but not in our region. Along with true austral migrants, several other species apparently undertake regular migrations

at tropical latitudes. At least five species recorded in the region for the first time since 1997 fit into this category of unspecified, intratropical migrants.

RUFOUS-THIGHED KITE *Harpagus diodon*

Partial migrant (Bildstein 2004) recorded twice: an adult perched in a *Cecropia* and feeding on cicadas along the Gold Miners' Trail c.28 km north of Alta Floresta on 17 September 1996 (AW), with another adult photographed still-hunting in a forest fragment 18 km north-west of Alta Floresta on 5 July 2005 (ACL; WA559352).

AZURE GALLINULE *Porphyrio flavirostris*

Two records of this highly migratory rallid. One at the pond behind FAH on 15 June 1998 (BMW) and another at a lake in the town on 31 January 2009 (BJWD; WA844846). Just outside our region, an adult was at a permanent wetland surrounded by cattle pasture 53 km north of Alta Floresta, near the border between Mato Grosso and Pará, on 9 February 2009 (BJWD).

SOUTH AMERICAN SNIPE *Gallinago paraguaiiae*

Two repeatedly flushed from a damp pasture at the edge of a perennial wetland 40 km west of Alta Floresta on 15 September 2004 (ACL; XC84209) and one reported at Limão on 6 July 2011 (S. Boddington).

ASH-COLOURED CUCKOO *Coccyzua cinerea*

Recorded five times: one videotaped along the Serra Trail on 11 June 2001 (BMW), singles seen from Tower I on 22 August 2001 (S. Hansson) and 29 June 2005 (S. Mahood), one in roadside scrub 8 km west of Alta Floresta on 28 April 2006 (S. Mahood) and one photographed at FAH on 5 May 2006 (T. Feltham; Fig. 13). Southern Amazonian records were summarised by Whittaker (2009).

PEARLY-BREASTED CUCKOO *Coccyzus euleri*

One documented record, a pair photographed and sound-recorded at the summit of the Serra Trail on 8 October 2012 (A. Spencer; XC115395; Fig. 15). Five additional, undocumented reports of singles, along the Serra Trail on 19 August 2001 (S. Hansson) and 7 October 2002 (W. & G. Carter), following a mixed-species flock at FAH on 2 May 2003 (ACL), flying across the rio Cristalino near Lagoa Cigana on 19 May 2003 (ACL) and foraging low in *igapó* forest along Kawall's Trail on 25 April 2005 (S. Mahood). All observers reported the absence of rufous primaries, but most reports are from dates within the expected range for migrant Yellow-billed Cuckoo *C. americanus*, and the rufous in the wings of that species can be difficult to see.

RUBY-TOPAZ HUMMINGBIRD *Chrysolanpis mosquitus*

Four records: a female or immature along the Serra Trail on 16 September 1997 (AW), a male in a degraded, bamboo-dominated corridor of riparian forest on the left bank of the rio Teles Pires, 30 km north of Alta Floresta, on 28 June 2004 (ACL, J. Tobias & F. Lambert), a female or immature photographed on the Serra Trail on 22 August 2011 (R. Hoyer; WA674843) and at least three (two males and a female or immature) at a flowering tree along the rio Santa Helena, 30 km west of Alta Floresta, on 19 July 2012 (BJWD). Seasonal movements into Amazonia poorly understood (Schuchmann 1999). Recorded 90 km south of Alta Floresta on the Serra dos Caiabis (Lees *et al.* 2008), at the Serra do Cachimbo (Pinto & Camargo 1957, Pacheco & Olmos 2005), 70 km north of Alta Floresta at the rio São Benedito II (BJWD), at



Figure 13. Ash-coloured Cuckoo *Coccyua cinerea*, 5 May 2006 (T. Feltham)

Figure 14. Pearly-breasted Cuckoo *Coccyzus euleri*, 8 October 2012 (A. Spencer)

Figure 15. Rufous-tailed Attila *Attila phoenicurus*, 5 October 2011 (R. Hoyer)

Santa Cruz Velha on the right bank of the rio Purus in Acre (Guilherme & Dantas 2008) and recently for the first time in Bolivia (Tobias & Seddon 2007). Perhaps best considered an 'unspecified intratropical migrant', with movement into Amazonia and north-east Brazil consistent with post-breeding dispersal from south of the tropical zone.

SOUTHERN SCRUB FLYCATCHER *Sublegatus modestus*

First recorded in late June 2002 by P. Donahue, this inconspicuous flycatcher is reported annually in small numbers in June–September. Observed in varied forest habitats from the canopy of continuous *terra firme* to small fragments and semi-deciduous patches, such as those along the Serra Trail (ACL; WA349438).

FUSCOUS FLYCATCHER *Cuemotriccus fuscatus*

Apparently a rare visitor to semi-deciduous forest. The only documented records concern one tape-recorded at Lagoa Cigana on 25 June 1998 (BMW) and another seen and tape-recorded 6–14 June 2004 atop the Serra Trail (ACL, J. Tobias & F. Lambert; XC67969). Resident locally throughout south-central Amazonia, principally in drier forests and *campinaranas* (BMW), and in our region collected at the rio Peixoto de Azevedo (Novaes

& Lima 1990), photographed on the Serra dos Caiabis (Lees *et al.* 2008) and resident in *campinarana* at the rio São Benedito II (BJWD).

PLAIN TYRANNULET *Inezia inornata*

Two documented reports, one tape-recorded on 7 September 2006 on the left bank of the rio Teles Pires opposite Ilha Ariosto (R. Hoyer; XC72934), and one photographed on the riverbank section of the Cajá Trail on 11 September 2010 (J. Davis & S. Boddington). Elsewhere in Mato Grosso, known from the Pantanal, Porto Limão, the rios do Cágado, Guaporé and Verde at sites north of Vila Bela da Santíssima Trindade, all in the south-west of the state (Willis & Oniki 1990). Common in Rondônia at Cachoeira Nazaré, May–July, with one bird in October (Stotz *et al.* 1997), and fairly common in June–July at Guajará-Mirim (Whittaker 2004).

LITTLE GROUND TYRANT *Muscisaxicola fluviatilis*

First found in the region on 13 November 2005 when one was on Ilha Ariosto (BJWD). Another, or perhaps the same, was there on 7 August 2008 (F. Ficagna & F. Souza), remained until at least mid October, and was seen again on 8 October 2009 (BJWD; WA572389), with it or another photographed on 30 October 2012 (G. Battistuzzo; WA871455). Previously reported in Mato Grosso at the upper rio Aripuanã in August–October (Pacheco 1995) with one photographed in the same area at Balneário Primavera on 24 September 2012 (M. C. Neto; WA754682).

YELLOW-BROWED TYRANT *Satrapa icterophrys*

First reported in mid-June 2005 from Ilha Ariosto (L. Navarrete). Subsequently, one was videotaped on 13 September 2005 at Fazenda Caiabi, 31 km west-southwest of Alta Floresta (ACL), associating with a mixed-species assemblage that included several other potential migrants (e.g., Small-billed Elaenia *Elaenia parvirostris*, Variegated Flycatcher *Empidonomus varius*, Crowned Slaty Flycatcher *E. aurantioatrocristatus*, White-throated Kingbird *Tyrannus albogularis*, Tropical Kingbird *T. melancholicus*, Fork-tailed Flycatcher *T. savana*, White-naped Xenopsaris *Xenopsaris albinucha* and Red-eyed Vireo *Vireo olivaceus*). They were observed, following the passage of a cold front the previous day, foraging in bamboo / scrub at the edge of continuous *terra firme* forest bordering cattle pasture, and had possibly been grounded by overnight rain. Similar conditions have produced ‘fall-outs’ of hundreds of *Tyrannus albogularis* and *T. savana* in the region on other occasions (ACL; e.g., WA840953). Just outside our region, one was seen on 1 September 2010 beside a reservoir near Fazenda Madeseik, c.50 km north of Alta Floresta (BJWD). Records of Yellow-browed Tyrant from southern Amazonia are few; a June sighting from Palafitas Island was apparently the first for Rondônia (Whittaker 2004).

SWAINSON'S FLYCATCHER *Myiarchus swainsoni*

Apparently a very rare migrant. First record a male collected on 10 June 1999 at Fazenda Guaraná, 11 km south-west of Alta Floresta (J. Weckstein; MPEG 54531). All subsequent records from the summit of the Serra Trail, where one first seen on 24 May 2003 (ACL) was tape-recorded on 2 June 2003 (AW), and perhaps the same bird was sound-recorded on 11 May 2004 (F. Lambert & J. Tobias) and 8 July 2005 (S. Mahood).

BOAT-BILLED FLYCATCHER *Megarynchus pitangua*

Uncommon to fairly common migrant first recorded at CJL in August 2001 (S. Hansson), with all subsequent records in April–October (earliest 24 April 2012; BJWD; WA624669) from forest and agricultural landscapes on both sides of the Teles Pires.

RUFOUS-TAILED ATTLA *Attila phoeniceurus*

The species' Amazonian wintering range is poorly known. In our region, first recorded on 11 August 2008, when one was photographed in *várzea* forest on Ilha Ariosto (B. Carlos & C. McFadden). Three subsequent records: one photographed on 26 September 2011 upstream of the Serra Trail (R. Hoyer; WA679974), what was presumably a different individual seen next day downstream of the lodge (T. Brooks & E. De Fonso) and a singing bird photographed on 5 October 2011 at the CJL clearing (R. Hoyer; Fig.15; WA679975). Previous Amazonian records have been from similar, river-edge habitats (Whittaker 2009).

CRESTED BECARD *Pachyramphus validus*

Scarce visitor, always in May–September. A female along the Rochas Trail on 1 May 2004 (F. Lambert & J. Tobias) was the first record. Subsequent sightings from the rio Cristalino involved one on 16 June 2004 (F. Lambert & J. Tobias), a female-plumaged bird near the summit of the Serra Trail on 6 August 2005 (KJZ & AW; KJZ audio recording) and a male photographed from Tower I on 7 September 2011 (R. Hoyer; WA673421). Two records from the left bank of the rio Teles Pires: a male photographed with a mixed-species flock on 21 June 2004 near the Centro de Pesquisas do Cacau (ACL) and a pair at FAH on 21 June 2008 (BJWD, A. Davies & R. Miller).

LINED SEEDEATER *Sporophila lineola*

First recorded in 1997, when up to ten were in the Bungalow Clearing at CJL, 10 October–16 November (BMW & CAM). This austral migrant has since become the most plentiful seedeater locally, with flocks of up to 40 readily found August–December on both sides of the rio Teles Pires.

Boreal migrants.—Parallel to our knowledge of the austral migration system, there have been only incremental gains in our understanding of the status of North American migrants in Amazonia since the publication of Stotz *et al.* (1992) and Paynter (1995). Twenty-one species of boreal migrants have been recorded in the region, including 12 species only since 1995. Little field work has been conducted between December and April, the peak time to discover wintering or migrant landbirds. The lack of any structured, understorey mist-netting may further explain the near-absence of *Catharus* thrushes (see Stotz *et al.* 1992). Shorebirds are relatively well known because they arrive earlier and are much easier to locate, given their preference for open areas and their concentration at the region's limited wetland habitats. Survey effort in July–September in 2005 and 2006 resulted in single-site counts of up to 19 Solitary Sandpipers *Tringa solitaria*, six Lesser Yellowlegs *T. flavipes* and three Pectoral Sandpipers *Calidris melanotos* (ACL), yet what little targeted effort there has been has not continued into October–November (peak passage for some species: Stotz *et al.* 1992). Almost all shorebirds recorded through late September are adults, but it is unclear whether the later passage of juveniles takes the same or a different route. Other boreal migrants likely in the future include: Peregrine Falcon *Falco peregrinus*, Upland Sandpiper *Bartramia longicauda*, Yellow-billed Cuckoo *Coccyzus americanus*, Cliff Swallow *Petrochelidon pyrrhonota* and Bobolink *Dolichonyx oryzivorus*.

BROAD-WINGED HAWK *Buteo platypterus*

Just two records from the region, one involving a migrating flock of ten (adults and immatures) over CJL on 8 November 1996 (AW) and the other a single adult at the FAH fragment on 15–18 December 1997 (CAM).

AMERICAN GOLDEN PLOVER *Pluvialis dominica*

The only records are a flock of c.60 at a football pitch in Alta Floresta on 12 September 2000 (AW), seven at a lake 35 km west-northwest of Alta Floresta on 26 August 2005 (ACL) and 27 photographed at a lake 35 km south of Alta Floresta on 9 September 2006 (ACL; WA559337). These records are all earlier than the published arrival date of 14 September at Manaus, Amazonas, where it is a common autumn migrant (Stotz *et al.* 1992).

GREATER YELLOWLEGS *Tringa melanoleuca*

One heard flying over Ilha Ariosto on 28 November 1997 (CAM) was the first record of what has subsequently proven to be a fairly regular migrant in July–November. Along with other migrant shorebirds, it occurs in both natural habitats, such as riverine sandbars and mudflats, and in man-made wetlands, e.g. dairy processing plants, fish farms and lakes amid cattle pasture.

LESSER YELLOWLEGS *Tringa flavipes*

Habitat preferences and patterns of occurrence similar to *T. melanoleuca*, with which it often occurs. Records span July–October with a max. 7 at Piscicultura Esteio on 2 August 2006 (ACL).

WHITE-RUMPED SANDPIPER *Calidris fuscicollis*

Seven records, most of them singles and all of them adults. One on 22 September 2005 at a large (100-ha) lake 35 km south of Alta Floresta (ACL; WA839402) was the first local record. Subsequent surveys in August–September 2006 produced singles at a lake 2 km south of Fazenda Cristalino on 30 August and 11–13 September, at the lake 35 km south of Alta Floresta on 9 September (WA559339) with two there on 21 September, and one at a lake 1 km west of Alta Floresta on 11–15 September (all ACL). The only record of a larger flock involved 26 adults photographed on Ilha Ariosto on 12 October 2007 (B. Freeman).

PECTORAL SANDPIPER *Calidris melanotos*

Singles photographed at a lake 35 km south of Alta Floresta on 27 September 2005 (ACL; WA880752) and on 21 September 2006 (ACL; WA348282). Uncommon at Manaus, but the commonest shorebird along the rio Ji-Paraná in Rondônia (Stotz *et al.* 1992), which suggests that most passage occurs west of Manaus and Alta Floresta.

STILT SANDPIPER *Calidris himantopus*

The only records were single adults photographed on 27 September 2005 and 9 September 2006 at a lake 35 km south of Alta Floresta (ACL; WA335242), with another 11–17 September 2006 at ponds 1 km west of Alta Floresta (ACL, WA839403). Stotz *et al.* (1992) listed just four records (six individuals) in Amazonian Brazil, but it has subsequently been collected at Carajás, Pará (Pacheco *et al.* 2007) and observed on river islands at Manaus and in the rio Madeira (BMW, AW & CAM). ACL, N. Moura & I Thompson saw c.40 with c.3,000 *Tringa flavipes* on the Pará coast at Bragança on 23 February 2013, still present on 17 March (ACL; e.g. WA912757). Elsewhere in Amazonia, Pearson (1980) considered it a regular transient in

eastern Ecuador south to northern Bolivia, and Parker *et al.* (1982) an uncommon migrant in Peru.

OLIVE-SIDED FLYCATCHER *Contopus cooperi*

Boreal migrant listed as Near Threatened (BirdLife International 2000), with habitat loss on the wintering grounds suspected to be a key factor in its decline. First recorded (precise location unknown) on 30 October 1989 (TAP; Willis 1993), followed by singles tape-recorded at CJL on 9 November 1996 (AW) and 11–13 October 1997 (BMW), one or more seen from the Serra Trail and Tower I in mid-December 2002 (A. Lang), 20 October 2003 to mid-March 2004 (BJWD & M. Shirley) and 28 October 2006 (M. Pretti). The cluster of records may reflect the uninterrupted views of the canopy that these locations afford, suggesting that the species is perhaps more plentiful at CJL than is known. Stotz *et al.* (1992) considered *C. cooperi* to be ‘thinly distributed across much of Brazil, although its main wintering grounds is along the lower slopes of the Andes up to about 2,000 m.’ The frequency with which it has been detected at Alta Floresta and other southern Amazonian sites, e.g. Carajás (Pacheco *et al.* 2007) and the rio São Benedito II (BJWD) in Pará, the rio Roosevelt (Whittaker 2009) and Borba in Amazonas (AW), and Fazenda Rancho Grande near Ariquemes in Rondônia (KJZ, AW), suggests that Amazonia may be a more important wintering area than previously acknowledged.

EASTERN WOOD PEWEE *Contopus virens*

Two along the Serra Trail on 9 November 1996 (AW) was the first record; however, since found annually at CJL during the boreal winter, with most observations on the Serra Trail. The only record south of the rio Teles Pires involved a single seen and heard at FAH on 5 December 1997 (CAM).

PURPLE MARTIN *Progne subis*

The most conspicuous boreal migrant passerine in the region, with the first record involving at least five adult males in a flock of *Progne* martins along the rio Teles Pires on 8 November 1996 (AW). Typically arrives in September, with the earliest record a male photographed on 14 September 2005 5 km east of Alta Floresta (ACL; WA559367), and present until at least February. A flock of *c.*200 *Progne*, containing about 40 adult male *P. subis*, was seen over the Teles Pires on 25 September 2005 (ACL). Many dropped down to the river to drink in flight. BJWD observed similar behaviour by a mixed-species flock of *Progne* containing many *P. subis* along the Teles Pires on 24 January 2004.

BANK SWALLOW *Riparia riparia*

A single sight record of a bird flying with a Barn Swallow *Hirundo rustica* over a temporary pond near Fazenda Cristalino on 5 October 1999 (BMW).

BARN SWALLOW *Hirundo rustica*

Probably under-recorded in the region, where first reported from the rio Cristalino on 23 November 1997 (CAM). Almost annual, with records spanning the period 5 October–16 April, and a max. 10 along the Cristalino on 21 March 2004 (BJWD).

VEERY *Catharus fuscescens*

A female of western North American *C. f. salicicola* was collected at CJL on 20 November 1993 (J. Haffer; MPEG 51750). The region is well within the species’ revised winter range as defined by Heckscher *et al.* (2011) based on data from geolocator tags. Late November is

close to the start of the 'non-transient period' (1 December–8 April) as defined therein, so this may have been a winterer rather than a passage migrant. However, in the absence of extensive surveys during midwinter, the species' status at Alta Floresta is uncertain.

Species for which we lack documentation.—Zimmer *et al.* (1997) listed four species as 'Hypothetical.' We have replaced this list with an auxiliary list of 22 species for which we lack details beyond location, date and observer. Because these records involve species outside of their known geographic or temporal ranges, we consider that supporting evidence is required for inclusion on the main list.

PIED-BILLED GREBE *Podilymbus podiceps*

A single report involving a basic-plumaged bird observed on the rio Cristalino just below the Serra Trail on 24 July 2008 (BJWD).

BLACK-CROWNED NIGHT HERON *Nycticorax nycticorax*

Single report of an immature roosting on Ilha Ariosto on 30 July 2006 (M. Pretti & K. Blumental).

BARE-FACED IBIS *Phimosus infuscatus*

Two at a roadside pool 10 km north of Alta Floresta with Wood Storks *Mycteria americana* and Jabiru *Jabiru mycteria* on 13 August 2011 (A. Binns), and presumably the same two at the same site on 15 August (R. Hoyer).

BLACKISH RAIL *Pardirallus nigricans*

This skulking rallid has been recorded just once: an adult at a marsh north of Alta Floresta on 30 July 1996 (AW). No subsequent reports, despite intensive surveys of suitable habitat, suggesting that it was a vagrant. Only one other published report from Amazonian Brazil, a sight record at Pedra Branca, Rondônia, on 11 February 1988 (Stotz *et al.* 1997).

FERRUGINOUS PYGMY OWL *Glaucidium brasilianum*

Included by Zimmer *et al.* (1997) based on a report by KJZ & AW, but given the lack of supporting documentation or subsequent reports of this species, which typically proliferates in anthropogenic habitats, we remove it from the main list.

STRAIGHT-BILLED HERMIT *Phaethornis bourcieri*

Listed as hypothetical in Zimmer *et al.* (1997) based on sight records by T. A. Parker, KJZ & BMW. Continues to be reported from the region, which records if correct probably pertain to *P. b. major*, an endemic of the Tapajós interfluvium, but we are unaware of any documented records.

BLUE-TUFTED STARThroat *Helimaster furcifer*

Reports of single males 17 km north-west of Alta Floresta on 2 June 2006 and 21 km north-west of Alta Floresta on 10 June 2006 (S. Mahood), in both instances visiting isolated flowering shrubs in pastures and neither could be relocated. It is conceivable that both sightings, involving birds seen c.4 km and one week apart, were of the same individual. Further south in Amazonian Mato Grosso, documented by photographs on 20 May 2009 at Salto Apiacas, 105 km west-southwest of Alta Floresta (BJWD; WA558155), Serra dos Caiabis (Lees *et al.* 2008) and Fazenda Currupira das Araras, Serra das Araras (BMW).

RED-SHOULDERED MACAW *Diopsittaca nobilis*

A single, aural encounter; flight calls were heard over the canopy at the Castanheira Trail on 11 June 1998 (BMW). Relatively widespread in transitional forest north and south of the region (Pacheco & Olmos 2005, Lees *et al.* 2008), so more records are expected.

GOLDEN PARAKEET *Guarouba guarouba*

One record involving three individuals at an unspecified site near Alta Floresta on 14 June 1991 (Lo 1995), observed perched and in flight at the forest edge, and with no obvious signs of recent captivity (V. K. Lo *in litt.*). The nearest published records are from southern Pará c.250 km north of Alta Floresta at Novo Progresso (Pacheco & Olmos 2005) and in *terra firme* and *várzea* north of the confluence of the rios Jamanxim and Tapajós (Oren & Novaes 1986), and from Rondônia on the right bank of the rio Madeira in Floresta Nacional do Jamari (Yamashita & Franca 1991, Laranjeiras & Cohn-Haft 2009).

SAPPHIRE-RUMPED PARROTLET *Touit purpuratus*

Listed by Zimmer *et al.* (1997) based on undocumented sightings. Given that it has not been recorded subsequently from the region and that Scarlet-shouldered Parrotlet *T. huetii* is now known to occur, we have concluded that the species requires documentation before being accepted on the main list.

ORANGE-BREASTED FALCON *Falco deiroleucus*

Two reports by experienced observers familiar with the species: an adult feeding with a pair of Bat Falcons *F. ruficularis* on aerial termites over FAH on 19 October 1995 (BMW), and a subadult from Tower I on 9 August 2010 (AW), flying low over the canopy, before heading strongly north. Perhaps the same individual was reported from the Serra Trail on 24 July 2010 (S. Boddington). Often misidentified (Howell & Whittaker 1995), we consider that records, even those by experienced observers, require documentation.

‘UNIDENTIFIED’ BUSHBIRD *Clytoctantes / Neoctantes* sp.

Zimmer *et al.* (1997) listed an unidentified bushbird as hypothetical from a brief sighting by T. A. Parker on the left bank of the Teles Pires. No subsequent reports; however, Rondonia Bushbird *Clytoctantes atrogularis* is now known, away from the type locality, on the left bank of the rio Ji-Paraná in Rondônia (Lanyon *et al.* 1990), from the rio Sucunduri in Amazonas (Whitney 2005), Parque Estadual Igarapés do Juruena, Mato Grosso (Oliveira *et al.* 2009) and a sight record from the left bank of the rio Roosevelt in Amazonas (Whittaker 2009), all of which are west of the Tapajós / Juruena. This low-density and easily overlooked species may yet be confirmed at Alta Floresta.

BLACK-BELLIED GNATEATER *Conopophaga melanogaster*

A report by T. A. Parker along the Gold Miners' Trail on the left bank of the rio Teles Pires in October 1989 (Zimmer *et al.* 1997). No subsequent reports from the original location (which was completely deforested prior to 1997) or elsewhere in the region. Nevertheless, has been documented east and west of Alta Floresta, with the nearest known localities along the middle rio Xingu in Pará (Graves & Zusi 1990), Comodoro in the Chapada dos Parecis in Mato Grosso (Whittaker 2009) and the rio Roosevelt in Amazonas (Whittaker 2009). The only other *Conopophaga* in the region, Chestnut-belted Gnateater *C. aurita snethllageae*, remains undocumented from the left bank of the Teles Pires in the region.

GREY-CAPPED FLYCATCHER *Myiozetetes granadensis*

Previously listed on the basis of a bird seen by P. Isler on 4 November 1989 (Zimmer *et al.* 1997), but just one subsequent report involving a single on 10 January 2010 at Lagoa Cigana (BJWD). The only sightings in Mato Grosso, and potentially a considerable range extension from the nearest locality at Cachoeira Nazaré, Rondônia (Stotz *et al.* 1997), where also undocumented. Further investigation into the 1989 record revealed that the bird was tape-recorded (ML48079). Examination of the recording by KJZ revealed that it pertained to the visually and vocally similar *M. luteiventris*, a species very poorly known in 1989. In light of this, and given the potential for misidentification of *granadensis* vs. *luteiventris*, we have removed the species from the main list until documentation can be obtained.

CRIMSON FRUITCROW *Haematoderus militaris*

T. Brooks briefly observed a female or immature from Tower II on 12 August 2011, the first report between the rios Tapajós and Tocantins. Published records from southern Amazonia are confined to the region east of the rio Tocantins (Novaes & Lima 2009, Lees *et al.* 2012) and the Madeira–Tapajós interfluvium, where it has been recorded at Cachoeira Nazaré in Rondônia (Stotz *et al.* 1997) and the rio Roosevelt in Amazonas (Whittaker 2009).

PURPLE-THROATED FRUITCROW *Querula purpurata*

Previously known from a report of an unseen bird vocalising at CJL in October 1990 (R. S. Ridgely, V. Emanuel & G. Tudor; Zimmer *et al.* 1997), with a male from the Serra Trail overlook on 2 July 2010 (J. Montejo & A. McAndrews). Occurs in adjacent transitional forest habitats on Serra dos Caiabis (Lees *et al.* 2008) and Serra do Cachimbo (Pacheco & Olmos 2005), so occasional wanderers might be expected at Alta Floresta. *Q. purpurata* tends to be relatively conspicuous, being usually encountered in pairs or small groups, whose far-carrying and frequently delivered vocalisations readily reveal their presence. It is therefore likely that the species is at best very rare in the region.

GREY-CHEEKED THRUSH *Catharus minimus*

Boreal migrant known from a single sighting of a bird heard calling and then observed at close range on the Serra Trail on 12 December 2002 (A. Lang). The observer was familiar with the species, but without documentation we are unwilling to accept what would be the southernmost record in eastern Amazonia (Stotz *et al.* 1992, Paynter 1995). To the north, one was collected 84 km south of Santarém on 15 December 1972 (Lees *et al.* 2013).

BLACK-BILLED THRUSH *Turdus ignobilis*

A single at Limão on 19 August 2010 (S. Boddington) is the only report. Common in transitional forests north and south of the study area (Pacheco & Olmos 2005, Lees *et al.* 2008).

BLACKPOLL WARBLER *Dendroica striata*

A basic-plumaged bird from Tower I at CJL with a mixed-species flock in the subcanopy on 31 January 2004 (BJWD). Primary winter range appears to be in north-west Amazonia (Ridgely & Tudor 1989, Paynter 1995) and, apart from this report, it is unknown in Mato Grosso, with the nearest records from Pará, where one was observed along the rio São Benedito on 24 November 2005 with a mixed-species flock that included Black-whiskered Vireo *Vireo altiloquus* (BJWD), and a male seen and sound-recorded near the mouth of the rio Tapajós at Alter do Chão on 24–28 January 1997 (CAM; ML117141), and in Amazonas at the rio Roosevelt (Whittaker 2009).

ORANGE-HEADED TANAGER *Thlypopsis sordida*

One at Limão on 17 August 2010 (S. Boddington) was searched for subsequently but could not be relocated. Its occurrence coincided with a cold front (S. Boddington *in litt.* 2011) during an extreme drought event (Lewis *et al.* 2011).

FAWN-BREASTED TANAGER *Pipraeidea melanonota*

A single, undocumented report of one on 29 May 2002 foraging with a mixed-species flock in the subcanopy along the rio Cristalino (P. Donahue & T. Woods). Essentially unknown in southern Amazonia, the nearest records being well south of the basin at the Chapada dos Guimarães, 600 km south of Alta Floresta (Lopes *et al.* 2009).

HEPATIC TANAGER *Piranga flava*

Reported by the first inventory on the basis of an all-red (mostly dusky-billed) male *Piranga* believed to be this species, and carefully studied as it moved 7–15 m above ground with a mixed-species canopy flock along the Rochas Trail on 22 October 1992 (KJZ & B. Schram). KJZ had previous field experience with the subspecies of *P. flava* (*saira*) that occurs further south in Mato Grosso (e.g., Chapada dos Guimarães), and both observers had extensive field experience with Summer Tanager *P. rubra*, which they eliminated largely on bill colour, and for which there are no records for Mato Grosso and very few for south-east Amazonia. Because there was no documentation, and there have been no further reports, we have opted to move this species to the undocumented list.

SOLITARY BLACK CACIQUE *Cacicus solitarius*

A sight record by T. A. Parker on the left bank of the Teles Pires some time between 26 and 31 October 1989 (Zimmer *et al.* 1997) is now treated as hypothetical given the lack of subsequent reports of a usually quite conspicuous species, and lack of information concerning the circumstances of the sighting.

Taxa not assigned to species level**GROUND CUCKOO sp.** *Neomorphus geoffroyi* / *squamiger*

Although an unidentified ground cuckoo was included on the original list, continued confusion over the taxon involved necessitates a review of recent sightings. Recorded on fewer than ten occasions, all at CJL, with the only record in the first inventory, one glimpsed by T. A. Parker on 23 August 1991 near to where KJZ had observed army ants (*Eciton* sp.) the previous afternoon. Parker did not see the bird sufficiently well to determine whether it was *N. squamiger* or *N. geoffroyi* (Zimmer *et al.* 1997). Twelve years elapsed before ACL tape-recorded bill-claps of two birds at a large *Eciton* sp. antswarm along the Rochas Trail on 7 June 2003 (recording on Marantz & Zimmer 2006). One was seen briefly, and although obviously assignable to the *geoffroyi* superspecies based on bare-parts coloration, views of the breast were inconclusive for specific identification. F. Lambert recorded bill-snapping in the same area on 4 May 2004 and glimpsed a ground cuckoo there on 19 June 2004, with another at the Cacao Trail on 22 May 2004.

G. Wallace (*in litt.* 2005) obtained prolonged views of singles at antswarms on the Castanheira Trail on 28 July 2005 and the Taboca Trail on 30 October 2005. The first bird had an ivory-coloured bill with a decurved culmen, shaggy crest, and dark blue head, neck and mantle. An apparently red eye was surrounded by pale blue orbital skin that further contrasted with the dark blue head. The wings were dark blue, grading to purplish black on the flight feathers. The underparts appeared mostly pale buff, with the throat and

upper breast scaled grey and bounded by a broad, but possibly incomplete, black band on the upper breast. The tail was greenish purple and undertail-coverts red. It remained on a low perch cocking its head back-and-forth while constantly raising and lowering the crest. That seen along the Taboca Trail was much plainer, with the upperparts and broad tail dull brownish to chestnut-green (unlike the deep blue of the bird on the Castanheira Trail), and the shaggy crest appeared blackish or dark brown. The throat and breast were densely patterned with rows of grey chevrons on a dirty buff background terminating in a narrow breast-band (as opposed to the broad band of the bird on the Castanheira Trail) that separated the throat / upper breast from the rest of the underparts, which were unmarked dull buff. The plumage features of the bird on the Castanheira Trail are most consistent with *N. g. geoffroyi*, which is biogeographically the most likely species in the region (Haffer 1977). However, KJZ & AW noted iris colour on two different individuals of *N. g. geoffroyi* from the rio Capim region of Pará to be pale yellow rather than red, and in Guajará-Mirim, Rondônia, AW recorded the eyes to be dull creamy white (Whittaker 2004). That seen along the Taboca Trail exhibited some features, most notably the indistinct breast-band, characteristic of the poorly known Scaled Ground Cuckoo *N. squamiger*, which is apparently restricted to northern Pará south of the Amazon between the rios Madeira and Tocantins. Another seen briefly by S. Olmstead on 9 September 2008 also lacked a breast-band. Given the unlikely possibility of two species of *Neomorphus* occurring sympatrically, we speculate that the lack of a breast-band may be a feature of the undescribed, juvenile plumage of *N. g. geoffroyi*, which appears the most likely explanation for the apparent presence of two different phenotypes in the region.

Unfortunately, none of the descriptions of *Neomorphus* from the study region have included details of the colour and pattern of the ear-coverts and malar regions (ferruginous to cinnamon, without dark barring in *N. squamiger*, vs. duller grey-brown and obviously barred in *N. geoffroyi*), which is arguably the most diagnostic means for separating the two taxa (Pinto 1964). It is also possible that the study region represents part of a contact zone between *N. squamiger* and *N. geoffroyi*, in which case phenotypically intermediate individuals might reflect hybridisation.

BJWD tape-recorded the song of a bird he glimpsed on the Cacau Trail on 13 July 2007. It gave, at four-second intervals, a deep, rising 'whooooooooorrrp.....whooooooooorrrp', easily passed-off as the song of a *Leptotila* dove, albeit deeper and longer in duration (BJWD; XC15743). This song is superficially similar to that of Rufous-winged Ground Cuckoo *N. rufipennis* (Zimmer & Hilty 1997) and *N. g. salvini*, the subspecies of Rufous-vented Ground Cuckoo in Panama (B. Zimmer recording). Just two previous records of *N. geoffroyi* from Mato Grosso: one observed by H. Sick at Diauarum, along the rio Manoel Correia, a tributary of the upper rio Xingu (Haffer 1977), and the other at the rio do Cágado, in the south-west of the state near the Bolivian border (Willis & Oniki 1990).

THICK-BILLED / VIOLACEOUS EUPHONIA *Euphonia lanirostris* / *violacea*

This species-pair was listed in the first inventory, their contact zone probably lies at or near Alta Floresta, and photographs suggest that both species may be present, but we consider that more extensive documentation is needed to resolve this question.

Changes to species limits.—The taxonomy of southern Amazonian birds was poorly studied until recently, making it unsurprising that recent work has clarified the systematics of some of the region's birds. Regional populations from ten species complexes treated by Zimmer *et al.* (1997) have been elevated to species rank by the South American Classification Committee of the American Ornithologists' Union (SACC; Remsen *et al.* 2013). Additionally,

populations of one species included in the first inventory that were not even recognised at subspecies level were subsequently described as a new species: Cryptic Forest Falcon *Micrastur mintoni* (Whittaker 2002). Lined Forest Falcon *M. gilvicollis* as presently recognised is not known to occur east of the rio Madeira (Whittaker 2002).

In ten other complexes, taxa occurring in the study region have been elevated from subspecies to species separate from those recognised in the first survey. Santarém Parakeet *Pyrhura amazonum* was split from Painted Parakeet *P. picta* (Ribas *et al.* 2006). Amazonian Trogon *Trogon ramonianus* was recognised as distinct from Guianan Trogon *T. violaceus* (DaCosta & Klicka 2008). Following a revision of Olive-backed Foliage-gleaner *Automolus infuscatus* (Zimmer 2002), populations south of the Amazon and east of the Madeira (including Alta Floresta) are treated as Pará Foliage-gleaner *A. paraensis*.

Zimmer *et al.* (1997) were unsure whether Spix's *X. spixii* or Elegant Woodcreepers *X. elegans* occurred at Alta Floresta, but Haffer (1997) clarified that issue by revising the taxonomy of this complex. Unlike previous authors, who treated *X. spixii* and *X. elegans* as polytypic, and in some places sympatric, Haffer recognised only *X. elegans* as polytypic, and concluded that nowhere are they truly sympatric. At Alta Floresta, they appear to be separated by the Teles Pires, with *X. spixii* occurring north and east of that river and along the rio Cristalino, and *X. elegans* south and west of the rio Teles Pires, including around the town of Alta Floresta (Haffer 1997, Aleixo 2002).

In one of their first papers investigating species limits in typical antbirds, Isler *et al.* (1999) found that vocal variation in Streaked Antwren *Myrmotherula surinamensis* was sufficient to merit treating southern and western Amazonian populations as a species, *M. multostriata*, Amazonian Streaked Antwren. Similar work with *Hypocnemis cantator* and *Schistocichla leucostigma* (Isler *et al.* 2007a,b, respectively) revealed that both of these actually represent complexes of several species. The relevant taxa occurring in the study region are now recognised as Spix's Warbling Antbird *Hypocnemis striata* and Rufous-faced Antbird *Schistocichla rufifacies*, respectively. White-bellied Tody-Tyrant *Hemitriccus griseipectus* was recognised as separate from White-eyed Tody-Tyrant *H. zosterops*, in part based on Cohn-Haft *et al.* (1997), and Guianan Tyrannulet *Zimmerius acer* was recently treated as specifically distinct from Slender-footed Tyrannulet *Z. gracilipes* based on genetic (Rheindt *et al.* 2008) and vocal differences (Ridgely & Tudor 1994, Hilty 2003).

Genetic work by Brumfield *et al.* (2007) demonstrated that inclusion of Scale-backed Antbird *Hylophylax poecilinotus* in *Hylophylax* made that genus paraphyletic. Thus a new genus, *Willisornis*, was erected for *poecilinotus* (Agne & Pacheco 2007). Furthermore, Isler & Whitney (2011) presented evidence that *poecilinotus* contains at least two biological species, and split subspecies *vidua* (with *nigrigula*) from populations west of the Tapajós. This also resulted in populations either side of the Teles Pires being elevated to full species, with the result that the regional list now contains two species of 'Scale-backed Antbirds', Common Scale-backed Antbird *W. poecilinotus griseiventris* and Xingu Scale-backed Antbird *W. vidua nigrigula*.

Additional splits include the local populations of *Momotus momota*, which is now named Amazonian Motmot (Stiles 2009), and Trogon *viridis*, Green-backed Trogon (DaCosta & Klicka 2008). A change in scientific name, but not English name, resulted from the elevation of the local population of White-necked Puffbird *Notharchus hyperrhynchus* to species from the more local Guianan Puffbird *N. macrorhynchus* following Zimmer (2004). Although no split was involved, a nomenclatural change was that of the scientific name for Crimson-bellied Parakeet from *Pyrhura rhodogaster* to *P. perlata* (Arndt & Roth 1986).

The first Brazilian records ascribed to Cabanis's Spinetail *Synallaxis cabanisi* (Zimmer *et al.* 1997) appear to represent a new taxon phenotypically similar to *S. cabanisi* but belonging

to the Rufous-capped Spinetail *S. ruficapilla* complex. It is, however, vocally distinct from these species (e.g., compare recordings on Marantz & Zimmer 2006 with Schulenberg 2000). This taxon occurs elsewhere in Mato Grosso near Paranaíta (50 km north-west of Alta Floresta) (L. F. Silveira) and the Xingu Refúgio Amazônico on the rio Von den Steinen (AW), with five specimens from Fazenda Ipê, Vila Rica, Mato Grosso (Batalha-Filho *et al.* 2013), from Pará along both the rio Riozinho near Aukre in the Kayapó reserve 'Pinkaiti' (BMW) and the rio Itacaiúnas at Parauapebas (G. Malacco audio recording), and from Maranhão, where E. Dente collected five skins (LSUMZ 71655–71659) at Fazenda do Caximbo, Coroatá (Olmos & Brito 2007, Stopiglia *et al.* 2013).

Discussion

Inter-regional patterns of species richness and sampling biases.—As a result of the high species richness and high incidence of rarity in tropical forest avifaunas (Terborgh *et al.* 1990, Thiollay 1994), inventories of such sites will become near-asymptotic only after many years of sampling by experienced observers throughout the year, across all possible microhabitats, and employing a variety of techniques (Cohn-Haft *et al.* 1997). Furthermore, habitat alteration, climate change and random vagrancy events from within a huge species-pool mean that even with intensive observer coverage, new species will continue to be added almost *ad infinitum*. The list presented here details a 21% increase on Zimmer *et al.* (1997), yet sampling is still not uniform across the year and mist-netting and specimen collecting effort is very limited. In the 16 years since the cut-off point for the first manuscript in 1995, fewer than 600 specimens have been collected in the entire region. Conclusions concerning species richness for entire regions can only be based on available data—typically, species inventories from scattered sites—and are dependent on the accuracy and completeness of those inventories (Remsen 1994). We nevertheless feel that at least the 'core' tall (*terra firme*, seasonally flooded and transitional) forest avifauna of the Alta Floresta region has now been sampled adequately.

Of the 124 species added to the list in the 17 years since the original survey, only 35 species (28%) are members of the 'core' (excluding migrants and vagrants), tall-forest avifauna. The remaining 72% of additions were from non-forest habitats (wetlands, fields, edge), semi-deciduous forest, or were migrants. An examination of the area list from the original survey reveals that 361 species could be considered core members of the tall-forest avifauna. With the addition of 35 species, the tall-forest avifauna of the region now stands at 398 species. It is particularly revealing that the original survey, based upon c.70 days of field work within a limited seasonal span (August–November), recorded 91% of the core, tall-forest avifauna as elucidated by an additional 17 years of much more intensive effort. More revealing still, is that the first ornithological surveys at Alta Floresta (T. A. Parker, M. Isler & P. Isler, 26 October–9 November 1989) and the rio Cristalino (T. A. Parker & KJZ, 18–26 August 1991, and KJZ & B. Schram, 20–26 October 1992), totalling just less than 30 days of combined field work, recorded upwards of 75% of the core, tall-forest avifauna. This provides further validation that the Rapid Assessment Program approach to avifaunal surveys, as originally conceived and developed by T. A. Parker for Conservation International (e.g., Remsen & Schulenberg 1997) can be effective in sampling most of the 'core' avifauna of even the most diverse tropical forests in a relatively short period. This provided that those conducting the surveys have the requisite knowledge of bird vocalisations and bearing in mind that more intense surveys may still be required to find some rare or low-density species.

Unfortunately, it is difficult to draw meaningful comparisons regarding species richness between the now thoroughly documented tall-forest avifauna of the Alta Floresta

region, and those of other well-known sites in Amazonia. In part, this stems from the lack of precision in defining a core, tall-forest avifauna. For many Amazonian sites, the distinction between high-ground *terra firme* forest and seasonally flooded *várzea* or *igapó* is sharply defined, and the avifaunal distinctions between these two habitats are readily apparent. As previously discussed, much of the forest along the rio Cristalino is difficult not to categorise as 'transitional forest' and the vast majority of forest species move rather freely between river-edge and interior forest, with little apparent discrimination. This has forced us to apply a broader habitat definition in defining the core, forest avifauna than that employed at other sites, with the result that attempts at meaningful inter-site comparisons are confounded.

Species totals from sprawling 'sites,' such as Alta Floresta and Carajás, are also naturally inflated when they straddle major rivers, or 'artificially' inflated through colonisation of non-forest species following deforestation, while comparison between sites may be further confounded by sampling artefacts, such as the size of the region sampled. Each of these factors are meaningful when attempting to draw comparisons between Alta Floresta and any other site. As evidenced by the fact that 71% of additions to the avifauna are from non-forest or second-growth habitats, many of them from areas distant from anywhere sampled by the original survey, it is clear that much of the perceived increase in species diversity is more accurately viewed as the result of ongoing anthropogenic habitat alteration and concomitant colonisation by open-country species, coupled with more systematic sampling of a large, but previously under-sampled study area.

Biodiversity inventories and systematic conservation planning.—Conservation planning in the 21st century requires an accurate assessment of biological diversity on a site-by-site basis, so trade-offs between reserve size and location, and species richness and endemism can be assessed (Winker 1996). As inventory efforts increase, so does the likelihood of detecting extinction-prone, rare and restricted-range taxa of higher conservation value (Manne *et al.* 1999). Ignoring spatial collecting bias may lead to important areas for avian conservation being overlooked (Bates & Demos 2001). It is not just conservation science that stands to gain from increasingly rigorous biodiversity inventories. Without a true appreciation of the patterns of diversity in lowland Amazonia, biogeographical research is also hampered. Locating ancient faunal and floral refugia, or the whereabouts of contact zones, and understanding trends in latitudinal, longitudinal and altitudinal diversity across the globe all depend on accurate and thorough biological surveys. Simultaneously, rampant habitat destruction creates a conservation imperative that initial regional surveys, at least, be conducted in a timely and efficient manner, and that the results of 'rapid assessments' be disseminated to the appropriate governmental agencies and NGOs swiftly.

Conclusions.—Alta Floresta, at the southern fringe of the Amazon basin and at the junction of major biomes and centres of endemism, has a diverse avifauna, the core of which is now among the most thoroughly sampled anywhere in Amazonia. Movement of non-forest species into the area, following ongoing and intensive degradation, loss and conversion of forest throughout the region (Morton *et al.* 2006), may result in apparent increases in species richness, but these are temporary and will eventually be more than offset by the local loss of species dependent on undisturbed, primary forest. Despite some domestic and international support, even designated protected areas are under severe pressure from the highest levels of government (Lees 2007). Government support for these protected areas is urgently needed, as is an immediate end to the intense (and often illegal) logging. For this remarkable avifauna to survive, concerted action aimed at reducing forest loss will be required from local, state and federal government, as well as from organisations inside Brazil and abroad.

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Appendix

List of 586 species recorded from the Alta Floresta region (Mato Grosso, Brazil) through December 2012. Asterisks (*) indicate species unrecorded by the first inventory (Zimmer *et al.* 1997). We present qualitative estimates of abundance for each species in suitable habitat. The categories are as follows: C—‘common’ (five or more individuals expected daily in appropriate habitat), FC—‘fairly common’ (less than five birds expected in appropriate habitat on most days or encountered irregularly in larger numbers), U—‘uncommon’ (encountered in small numbers on a less than daily basis), R—‘rare’ (encountered only a few times per season or resident locally in very small numbers), and VR—‘very rare’ (recorded on fewer than ten occasions), VR*—species not reliably reported since the first inventory. Documentation is as follows: X = specimen deposited at the Museu Paraense Emílio Goeldi (Belém), A = audio recording, P = photographic or video record, S = sight or aural record. A dagger (†) indicates that the species is represented on Marantz & Zimmer (2006) by a recording made within the study region. Digital vouchers are indicated in parentheses: M = sound-recordings archived at the Macaulay Library, Cornell Lab of Ornithology <http://macaulaylibrary.org>; X = sound-recordings on Xeno-Canto <http://www.xeno-canto.org> and W = images included on Wikiaves www.wikiaves.com.br. Habitat categories correspond to those used in the main text, and are coded as follows: N—non-forest, open-country habitats, such as pastures; PF—palm forest (refers to patches of swampy forest composed mostly of *Mauritia flexuosa*); R—riverine / river edge within otherwise forested habitat; S—scrub and second growth; TF—tall forest (*terra firme*, transitional and seasonally flooded forest); TFe—species occurring at the margins of tall forest, but not including river-edge forest; W—wetlands. Microhabitat preference, where noteworthy, is indicated by the following lower case characters in parentheses: aa—army

ants (pertains to obligate army-ant followers, but does not include occasional or opportunistic followers); ae—aerial (applies to species seen primarily in flight); b—bamboo stands, generally within tall forest or at forest edge; b / v—bamboo and vine tangles; sd—semi-deciduous forest growing on granitic *serras* surrounded by *terra firme* forest. Where more than one habitat is listed, we order them in decreasing order of preference in the Alta Floresta region. Most species are year-round residents in the region, but some occur only seasonally. The latter are denoted as AM—austral migrants (if followed by * some individuals also resident), BM—boreal migrants, or UM—unspecified, intratropical migrants (if followed by * some individuals also resident). Taxonomy and scientific nomenclature follows Remsen *et al.* (2013).

Order / Family / Scientific name	Common name	Abundance (this work)	Abundance (Zimmer <i>et al.</i>)	Supporting evidence	Habitat, microhabitat & seasonality
TINAMIDAE (tinamous)					
<i>Tinamus tao</i>	Grey Tinamou	U	U	A	TF
<i>Tinamus major</i>	Great Tinamou	FC	FC	A, P (M,X,W)	TF
<i>Tinamus guttatus</i>	White-throated Tinamou	R	R	A	TF
<i>Crypturellus cinereus</i>	Cinereous Tinamou	C	C	A†, P (M,X,W)	R, TFe
<i>Crypturellus soui</i>	Little Tinamou	FC	FC	A (M)	S, Tfe
<i>Crypturellus obsoletus</i>	Brown Tinamou	U	U	A† (M,X)	TF
<i>Crypturellus undulatus</i> *	Undulated Tinamou	FC		X† (M,X)	R
<i>Crypturellus strigulosus</i>	Brazilian Tinamou	C	FC–C	A† (M,X)	TF
<i>Crypturellus variegatus</i>	Variegated Tinamou	FC	FC	A (X)	TF
<i>Crypturellus parvirostris</i>	Small-billed Tinamou	R	R	X (X)	S, N
<i>Crypturellus tataupa</i>	Tataupa Tinamou	C	U	X† (M)	TF (sd), S
ANATIDAE (ducks)					
<i>Dendrocygna viduata</i> *	White-faced Whistling Duck	U		P (W)	W
<i>Dendrocygna autumnalis</i> *	Black-bellied Whistling Duck	U		A‡, P (M,W)	W
<i>Cairina moschata</i>	Muscovy Duck	FC	U	A, P (X,W)	W, R
<i>Amazonetta brasiliensis</i>	Brazilian Teal	C	R	P (W)	W
<i>Nomonyx dominicus</i> *	Masked Duck	VR		P (W)	W / UM
CRACIDAE (guans)					
<i>Penelope jacquacu</i>	Spix's Guan	FC	FC	X (M,X,W)	TF
<i>Pipile cujubi</i>	Red-throated Piping Guan	U–FC	FC	X (M,X,W)	R
<i>Ortalis guttata</i> *	Speckled Chachalaca	FC		A, P (W)	S, N, R
<i>Crax fasciolata</i> *	Bare-faced Curassow	U		X (M,X,W)	R, TF
<i>Mitu tuberosum</i>	Razor-billed Curassow	U	U	X (M,X,W)	R, TF
ODONTOPHORIDAE (New World quail)					
<i>Odontophorus gujanensis</i>	Marbled Wood Quail	FC	FC–U	X† (M,X)	TF
PODICIPEDIDAE (grebes)					
<i>Tachybaptus dominicus</i> *	Least Grebe	R		S	W
CICONIIDAE (storks)					
<i>Ciconia maguari</i> *	Maguari Stork	VR		P (W)	W / UM
<i>Jabiru mycteria</i> *	Jabiru	R		P (W)	W
<i>Mycteria americana</i>	Wood Stork	U–FC	U	P (W)	W
PHALACROCORACIDAE (cormorants)					
<i>Phalacrocorax brasilianus</i>	Neotropic Cormorant	C	C	P (W)	W, R

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ANHINGIDAE (darters)					
<i>Anhinga anhinga</i>	Anhinga	U	FC	A, P (X, W)	W, R
ARDEIDAE (herons)					
<i>Tigrisoma lineatum</i>	Rufescent Tiger Heron	FC	FC	A, P (W)	R, W
<i>Agamia agami</i> *	Agami Heron	R–U		P (W)	R
<i>Cochlearius cochlearius</i> *	Boat-billed Heron	R–U		P (W)	R, W
* <i>Zebrilus undulatus</i> *	Zigzag Heron	R–U		A, P (M, X, W)	R
<i>Ixobrychus exilis</i> *	Least Bittern	VR		S	W / UM
<i>Butorides striata</i>	Striated Heron	FC–C	FC	P (W)	W, R
<i>Bubulcus ibis</i>	Cattle Egret	C	C	P (W)	N, W
<i>Ardea cocoi</i>	Cocoi Heron	U	U	P (W)	W, R
<i>Ardea alba</i>	Great Egret	C	U	P (W)	W, R
<i>Pilherodius pileatus</i>	Capped Heron	FC	U	P (W)	R, W
<i>Egretta thula</i>	Snowy Egret	C	R	P (W)	W, R
THRESKIORNITHIDAE (ibises)					
<i>Mesembrinibis cayennensis</i>	Green Ibis	FC	FC	A†, P (M, W)	R, W
CATHARTIDAE (New World vultures)					
<i>Cathartes aura</i> *	Turkey Vulture	C		P (W)	N
<i>Cathartes burrovianus</i>	Lesser Yellow-headed Vulture	FC	R	P (W)	N
<i>Cathartes melambrotus</i>	Greater Yellow-headed Vulture	FC	FC	P (W)	TF
<i>Coragyps atratus</i>	Black Vulture	C	C	P (W)	N
<i>Sarcorampus papa</i>	King Vulture	U	U	P (W)	TF
PANDIONIDAE (Osprey)					
<i>Pandion haliaetus</i>	Osprey	R	R	S	R, W / BM
ACCIPITRIDAE (hawks)					
<i>Elanus leucurus</i> *	White-tailed Kite	FC	R	P	N
<i>Gampsonyx swainsonii</i>	Pearl Kite	FC	R	P (W)	N
<i>Chondrohierax uncinatus</i>	Hook-billed Kite	U	U	A, P (W)	R, TF / UM
<i>Leptodon cayanensis</i>	Grey-headed Kite	U	U	A, P (W)	TF, R
<i>Elanoides forficatus</i>	Swallow-tailed Kite	U–FC	U	P (W)	TF, R / UM*
<i>Morphnus guianensis</i>	Crested Eagle	R	R	A†, P (W)	TF, R
<i>Harpia harpyja</i>	Harpy Eagle	R	R	A†, P (M, X, W)	TF, R
<i>Spizaetus melanoleucus</i>	Black-and-white Hawk-Eagle	R–U	R	P (W)	TF, N
<i>Spizaetus tyrannus</i>	Black Hawk-Eagle	U	R	A, P (W)	TF, R, TFe
<i>Spizaetus ornatus</i>	Ornate Hawk-Eagle	R–U	R	A, P (W)	TF, R
<i>Busarellus nigricollis</i> *	Black-collared Hawk	U–FC		A, P (W)	W, R
<i>Rostrhamus sociabilis</i>	Snail Kite	U–FC	U	P (W)	W, N / UM
<i>Harpagus bidentatus</i>	Double-toothed Kite	U	U	P (W)	TF
<i>Harpagus diodon</i> *	Rufous-thighed Kite	VR		P (W)	TF, TFe / AM
<i>Ictinia plumbea</i>	Plumbeous Kite	FC	FC	A†, P (M, W)	TF, TFe / UM*

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<i>Accipiter poliogaster</i>	Grey-bellied Hawk	R	R	A, P	TF
<i>Accipiter superciliosus</i>	Tiny Hawk	R–U	R	A, P (W)	TF
<i>Accipiter bicolor</i>	Bicoloured Hawk	VR	R	A, P (X,W)	TF
<i>Geranospiza caerulescens</i>	Crane Hawk	R–U	R	P (W)	R
<i>Buteogallus schistaceus</i> *	Slate-coloured Hawk	VR		P (W)	R
<i>Buteogallus urubitinga</i>	Great Black Hawk	FC	U	X (X,W)	R, TF, W
<i>Rupornis magnirostris</i>	Roadside Hawk	C	R	A, P (W)	N, TFe
<i>Geranoaetus albicaudatus</i>	White-tailed Hawk	U	R	P (W)	N
<i>Leucopternis albicollis</i> *	White Hawk	U		P (W)	TF
<i>Leucopternis melanops</i> *	Black-faced Hawk	VR		P	TF
<i>Leucopternis kuli</i>	White-browed Hawk	U	R	A†, P (M,X,W)	TF, TFe
<i>Buteo nitidus</i> *	Grey-lined Hawk	C		A, P (X,W)	N, TFe
<i>Buteo platypterus</i> *	Broad-winged Hawk	VR		S	TF / BM
<i>Buteo brachyurus</i>	Short-tailed Hawk	U–FC	R	P (W)	N, TF, TFe
ARAMIDAE (Limpkin)					
<i>Aramus guarauna</i>	Limpkin	U–FC	U	P (W)	W
PSOPHIIDAE (trumpeters)					
<i>Psophia viridis</i>	Dark-winged Trumpeter	U	U	X† (X,W)	TF
RALLIDAE (rails)					
<i>Aramides cajanea</i>	Grey-necked Wood Rail	FC	U	A, P (W)	R
<i>Amaurolimnas concolor</i> *	Uniform Crake	VR		P (W)	R
<i>Anurolimnas viridis</i> *	Russet-crowned Crake	FC		A, P (X)	N, S
<i>Laterallus melanophaius</i>	Rufous-sided Crake	U	U	A (M)	N, W
<i>Laterallus exilis</i>	Grey-breasted Crake	FC	U	A, P (M,X,W)	N, W
<i>Porzana albicollis</i>	Ash-throated Crake	FC	R	A, P (W)	W
<i>Neocrex erythrops</i> *	Paint-billed Crake	VR		P	W
<i>Gallinula galeata</i> *	Common Gallinule	U		P	W
<i>Porphyrio martinica</i>	Purple Gallinule	FC	U	A†, P (M)	W
<i>Porphyrio flavirostris</i> *	Azure Gallinule	VR		P (W)	W / UM
HELIORNITHIDAE (finfoots)					
<i>Heliornis fulica</i>	Sungrebe	U	R	X† (M,W)	W, R
EURYPYGIDAE (Sunbittern)					
<i>Eurypyga helias</i>	Sunbittern	U	U	A, P (W)	R
CHARADRIIDAE (plovers)					
<i>Pluvialis dominica</i> *	American Golden Plover	VR		P (W)	W, N / BM
<i>Vanellus cayanus</i>	Pied Lapwing	U	R	A, P (M,X,W)	W, R
<i>Vanellus chilensis</i>	Southern Lapwing	C	U	A, P (X,W)	W, N
RECURVIROSTRIDAE (avocets and stilts)					
<i>Himantopus mexicanus</i> *	Black-necked Stilt	VR		S	W / UM

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SCOLOPACIDAE (sandpipers)					
<i>Gallinago paraguayae</i> *	South American Snipe	VR		A (X)	W / AM
<i>Actitis macularius</i>	Spotted Sandpiper	U-FC	R	P (W)	W, R / BM
<i>Tringa melanoleuca</i> *	Greater Yellowlegs	U		P (W)	W / BM
<i>Tringa flavipes</i> *	Lesser Yellowlegs	U-FC		X (W)	W / BM
<i>Tringa solitaria</i>	Solitary Sandpiper	FC	U	P (W)	W / BM
<i>Calidris fuscicollis</i> *	White-rumped Sandpiper	R		P (W)	W / BM
<i>Calidris melanotos</i> *	Pectoral Sandpiper	VR		P (W)	W / BM
<i>Calidris himantopus</i> *	Stilt Sandpiper	VR		P (W)	W / BM
JACANIDAE (jacanas)					
<i>Jacana jacana</i>	Wattled Jacana	C	FC	A, P (W)	W
LARIDAE (gulls and terns)					
<i>Sterna superciliosa</i>	Yellow-billed Tern	U	R	P (W)	W
<i>Phaetusa simplex</i>	Large-billed Tern	U	R	P (W)	W
RYNCHOPIDAE (skimmers)					
<i>Rynchops niger</i>	Black Skimmer	U	R	P (W)	W
COLUMBIDAE (pigeons and doves)					
<i>Columbina talpacoti</i>	Ruddy Ground Dove	C	C	A, P	N
<i>Columbina squammata</i> *	Scaled Dove	U		P (W)	N
<i>Claravis pretiosa</i>	Blue Ground Dove	U-FC	U	A, P (W)	TF (sd), R
<i>Patagioenas speciosa</i> *	Scaled Pigeon	U		A, P (M,W)	TF (sd), R
<i>Patagioenas picazuro</i> *	Picazuro Pigeon	U		P	N
<i>Patagioenas cayennensis</i>	Pale-vented Pigeon	C	R	P (W)	R, N
<i>Patagioenas plumbea</i>	Plumbeous Pigeon	FC	FC	X+ (M,X,W)	TF
<i>Patagioenas subvinacea</i>	Ruddy Pigeon	FC	FC-C	A+, P (M)	TF, R
<i>Leptotila verreauxi</i> *	White-tipped Dove	FC		A, P (W)	S, N
<i>Leptotila rufaxilla</i>	Grey-fronted Dove	FC	FC	X+ (W,X,W)	R, TFe
<i>Geotrygon violacea</i> *	Violaceous Quail-Dove	VR		P (W)	R, TF / UM?
<i>Geotrygon montana</i>	Ruddy Quail-Dove	U	FC	X (M)	TF / UM
OPISTHOCOMIDAE (Hoatzin)					
<i>Opisthocomus hoazin</i> *	Hoatzin	FC		A, P (M,X,W)	R
CUCULIDAE (cuckoos)					
<i>Coccyzua minuta</i>	Little Cuckoo	U	U	X+ (M,W)	S, N, R / UM?
<i>Coccyzua cinerea</i> *	Ash-coloured Cuckoo	VR		P	TF, R / AM
<i>Piaya cayana</i>	Squirrel Cuckoo	FC	FC	A+, P (M,X,W)	TF, R
<i>Piaya melanogaster</i>	Black-bellied Cuckoo	U	U	A+, P (M,X,W)	TF
<i>Coccyzus melacoryphus</i>	Dark-billed Cuckoo	U	U	A, P	N, S / AM
<i>Coccyzus euleri</i>	Pearly-breasted Cuckoo	VR		A, P (X)	TF, R / AM
<i>Crotophaga major</i>	Greater Ani	FC	U	A, P (W)	R
<i>Crotophaga ani</i>	Smooth-billed Ani	C	C	A, P (M,W)	N

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<i>Guira guira</i> *	Guira Cuckoo	C		A, P (X,W)	N
<i>Tapera uaevia</i> *	Striped Cuckoo	FC		A, P (M)	N, S
<i>Dromococcyx phasianellus</i>	Pheasant Cuckoo	R–U	U	X+ (M,X)	R, TF, S
<i>Dromococcyx pavoninus</i>	Pavonine Cuckoo	R–U	R	A, P (M,X)	TF (b)
<i>Neomorphus geoffroyi</i> / <i>squamiger</i>	Rufous-vented / Scaled Ground Cuckoo	VR	R	A+ (X)	TF
TYTONIDAE (barn owls)					
<i>Tyto alba</i>	Barn Owl	U	U	S	N
STRIGIDAE (owls)					
<i>Megascops choliba</i> *	Tropical Screech Owl	FC		A, P (X,W)	N, S
<i>Megascops watsonii</i>	Tawny-bellied Screech Owl	FC–C	FC–C	A+, P (M,W)	TF
<i>Lophotrix cristata</i>	Crested Owl	U–FC	U	A+, P (M,W)	TF
<i>Pulsatrix perspicillata</i>	Spectacled Owl	U	U	A (X)	TF, TFe
<i>Ciccaba virgata</i>	Mottled Owl	U	U	A	TF
<i>Ciccaba hula</i>	Black-banded Owl	R–U	R	A, P (M,X,W)	TF
<i>Glaucidium hardyi</i>	Amazonian Pygmy Owl	U–FC	U	A+, P (M,X,W)	TF
<i>Athene cunicularia</i>	Burrowing Owl	C	R	A, P (W)	N
<i>Pseudoscops clamator</i> *	Striped Owl	R		A, P (W)	N
NYCTIBIIDAE (potoos)					
<i>Nyctibius grandis</i>	Great Potoo	U	U	A, P (X,W)	TF, TFe, R
<i>Nyctibius aethereus</i> *	Long-tailed Potoo	VR		A, P (X,W)	TF
<i>Nyctibius griseus</i> *	Common Potoo	FC		A, P (W)	N, TFe
CAPRIMULGIDAE (nightjars)					
<i>Chordeiles nacunda</i> *	Nacunda Nighthawk	U–R		P (W)	N / UM
<i>Chordeiles minor</i>	Common Nighthawk	VR	R (as <i>Chordeiles</i> sp.)	S	TF (ae) / BM
<i>Lurocalis semitorquatus</i>	Short-tailed Nighthawk	FC	FC	A (M,W)	TF, R
<i>Nyctipolus nigrescens</i>	Blackish Nightjar	C	C	X+ (M,X,W)	TF, TFe, NF (sd)
<i>Nyctidromus albicollis</i>	Common Pauraque	C	U	A+, P (X,W)	TF, TFe, S, R
<i>Setopagis parvulus</i>	Little Nightjar	U	U	A, P (X)	TF, S, N / UM?
<i>Hydropsalis maculicaudus</i>	Spot-tailed Nightjar	U	U–R	A	N
<i>Hydropsalis climacocerca</i>	Ladder-tailed Nightjar	U	R	A, P (X,W)	R
<i>Nyctiphrynus ocellatus</i>	Ocellated Poorwill	U–FC	U–FC	A, P (X,W)	TF (b)
<i>Antrostomus</i> <i>sericocaudatus</i> *	Silky-tailed Nightjar	R		A	TF
<i>Antrostomus rufus</i> *	Rufous Nightjar	VR		A	TFe (sd)
APODIDAE (swifts)					
<i>Cypseloides senex</i>	Great Dusky Swift	R	R	P (M,W)	TF (ae), R, N / UM
<i>Streptoprocne zonaris</i>	White-collared Swift	U–R	U–R	S	TF, R (ae)

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<i>Chaetura cinereiventris</i>	Grey-rumped Swift	C	C	A, P (X,W)	TF, R (ae)
<i>Chaetura egregia</i>	Pale-rumped Swift	U-FC	U-FC	A, P (W)	TF, R (ae)
<i>Chaetura viridipennis</i> *	Amazonian Swift	U-FC		A,P (M)	TF, R (ae)
<i>Chaetura brachyura</i>	Short-tailed Swift	C	U-FC	A, P (W)	N, TF, R (ae)
<i>Tachornis squamata</i>	Fork-tailed Palm Swift	C	U-FC	A, P	PF, N
<i>Panyptila cayennensis</i> *	Lesser Swallow-tailed Swift	U		S	TF, R, N (ae)
* TROCHILIDAE (hummingbirds)					
<i>Topaza pella</i> *	Crimson Topaz	R		A, P	R
<i>Florisuga mellivora</i>	White-necked Jacobin	U-FC	U	A, P (W)	TF, TFe, R
<i>Glaucis hirsutus</i>	Rufous-breasted Hermit	U-FC	U	X (X)	R, S, TFe
<i>Threnetes leucurus</i>	Pale-tailed Barbthroat	R-U	U	X (W)	TF, R
<i>Phaethornis aethopyga</i> *	Tapajós Hermit	R		A, P	TF, R, S
<i>Phaethornis ruber</i>	Reddish Hermit	C	FC	A†, P (M,W)	TF, TFe, S
<i>Phaethornis hispidus</i> *	White-bearded Hermit	R		P (W)	TF, R
<i>Phaethornis superciliosus</i>	Eastern Long-tailed Hermit	FC-C	FC	X	TF
<i>Heliothryx auritus</i>	Black-eared Fairy	U	U	X (X,W)	TF
<i>Polytmus theresiae</i> *	Green-tailed Goldenthrout	VR		A (X)	S
<i>Avocettula recurvirostris</i> *	Fiery-tailed Awlbill	VR		P (W)	TF (sd), R
<i>Chrysolampis mosquitus</i> *	Ruby-topaz Hummingbird	VR		P (W)	TFe (sd), R / UM
<i>Anthracothorax nigricollis</i>	Black-throated Mango	FC	U	A, P (X,M)	N, TFe, R
<i>Discosura langsdorffi</i>	Black-bellied Thorntail	R	R	P	TF
<i>Lophornis chalybeus</i> *	Festive Coquette	VR		P (W)	TF (sd)
<i>Heliodoxa aurescens</i> *	Gould's Jewelfront	VR		P (W)	TF
<i>Heliomaster longirostris</i>	Long-billed Starthroat	U-FC	U	A, P (X,W)	N, R, TFe
<i>Calliphlox amethystina</i>	Amethyst Woodstar	U	U	A, P (W)	TF, TFe
<i>Campylopterus largipennis</i>	Grey-breasted Sabrewing	FC	FC	X (X,W)	TF, R
<i>Thalurania furcata</i>	Fork-tailed Woodnymph	C	C	X (X,M,W)	TF
<i>Amazilia versicolor</i>	Versicoloured Emerald	FC	FC-U	A†, P (M,X,W)	TFe, N
<i>Amazilia fimbriata</i>	Glittering-throated Emerald	U	R	A, P	N
<i>Hylocharis sapphirina</i>	Rufous-throated Sapphire	R	R	A, P (W)	TF
<i>Hylocharis cyanus</i>	White-chinned Sapphire	C	U-R	A†, P (M)	TF, TFe
TROGONIDAE (trogons)					
<i>Pharomachrus pavoninus</i>	Pavonine Quetzal	R-U	U-R	A†, P (M,X,W)	TF
<i>Trogon melanurus</i>	Black-tailed Trogon	FC-C	FC-C	X† (M,X,W)	TF, R
<i>Trogon viridis</i>	Green-backed Trogon	FC-C	FC-C	A, P (M,X,W)	TF, R
<i>Trogon ramonianus</i>	Amazonian Trogon	U-FC	U-FC	A, P (M,X,W)	TF, R
<i>Trogon curucui</i>	Blue-crowned Trogon	U-FC	U-FC	A†, P (M,X,W)	TF, TFe, R
<i>Trogon rufus</i>	Black-throated Trogon	U	U	A†, P (M)	TF, R
<i>Trogon collaris</i>	Collared Trogon	FC	FC	X† (M,X,W)	TF, R

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ALCEDINIDAE (kingfishers)					
<i>Megaceryle torquata</i>	Ringed Kingfisher	FC	FC-U	A, P (W)	R, W
<i>Chloroceryle amazona</i>	Amazon Kingfisher	FC	FC-C	A†, P (X,W)	R, W
<i>Chloroceryle americana</i>	Green Kingfisher	U-FC	U	A†, P (M,X)	R, W
<i>Chloroceryle inda</i>	Green-and-rufous Kingfisher	U	U	A†, P (M,W)	R
<i>Chloroceryle aenea</i>	American Pygmy Kingfisher	U	R	X, P (W)	R
MOMOTIDAE (motmots)					
<i>Electron platyrhynchos</i>	Broad-billed Motmot	FC	FC	X† (M,X)	TF
<i>Baryphthengus martii</i> *	Rufous Motmot	R		X† (M,X)	TF
<i>Monotus momota</i>	Amazonian Motmot	FC	FC	X (M,X,W)	TF
GALBULIDAE (jacamars)					
<i>Brachygalba lugubris</i>	Brown Jacamar	U	U	A, P (M,W)	R
<i>Galbula cyanicollis</i>	Blue-cheeked Jacamar	FC	U	X† (M,X,W)	TF
<i>Galbula ruficauda</i>	Rufous-tailed Jacamar	FC	FC	A†, P (M,X,W)	R, TFe
<i>Galbula leucogastra</i>	Bronzy Jacamar	R	R	A†, P (M,X,W)	R, TFe
<i>Galbula dea</i>	Paradise Jacamar	FC	FC-C	X† (M,X,W)	TF, R
<i>Jacamerops aureus</i>	Great Jacamar	U	U-FC	A, P (M,X,W)	TF
BUCCONIDAE (puffbirds)					
<i>Notharchus hyperythynchus</i>	White-necked Puffbird	FC	FC	A, P (M,X,W)	TF, R
<i>Notharchus ordii</i>	Brown-banded Puffbird	U	U	A, P (M,X,W)	TFe (sd), R
<i>Notharchus tectus</i>	Pied Puffbird	U	U	X (W)	TF, R
<i>Bucco tamatia</i> *	Spotted Puffbird	R		A, P (X,W)	TFe (sd), R
<i>Bucco capensis</i>	Collared Puffbird	R-U	R	A, P (M,X,W)	TF
<i>Nystalus striolatus</i>	Striolated Puffbird	FC	FC	X (M,X,W)	TF
<i>Malacoptila rufa</i>	Rufous-necked Puffbird	R-U	R	X† (X,W)	TF
<i>Nonnula rubecula</i> *	Rusty-breasted Nunlet	VR		A, P	TF
<i>Nonnula ruficapilla</i>	Rufous-capped Nunlet	U	R	X† (M,X,W)	TF (b)
<i>Monasa nigrifrons</i>	Black-fronted Nunbird	C	C	A†, P (M,W)	R, TFe, S
<i>Monasa morphoeus</i>	White-fronted Nunbird	C	C	A†, P (M,X,W)	TF
<i>Chelidoptera tenebrosa</i>	Swallow-winged Puffbird	C	C	X (M,X,W)	R, TFe
CAPITONIDAE (New World barbets)					
<i>Capito dayi</i>	Black-girdled Barbet	FC	U-FC	A†, P (M,X,W)	TF
RAMPHASTIDAE (toucans)					
<i>Ramphastos tucanus</i>	White-throated Toucan	C	C	X† (M,W)	TF, R
<i>Ramphastos vitellinus</i>	Channel-billed Toucan	FC-C	FC	X† (M,X,W)	TF, R
<i>Selenidera gouldii</i>	Gould's Toucanet	U	FC	X† (M,X,W)	TF, R
<i>Pteroglossus inscriptus</i>	Lettered Aracari	FC	FC	X† (M,W)	TF, TFe, R
<i>Pteroglossus aracari</i> *	Black-necked Aracari	R		X (W)	TF, R
<i>Pteroglossus castanotis</i>	Chestnut-eared Aracari	FC	FC	P† (M,W)	TF, R
<i>Pteroglossus beauharnaesii</i>	Curl-crested Aracari	U	U	X† (M,X,W)	TF, R

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<i>Pteroglossus bitorquatus</i>	Red-necked Aracari	FC	U	X (M,X,W)	TF, R
PICIDAE (woodpeckers)					
<i>Picumnus aurifrons</i>	Bar-breasted Piculet	FC	FC	X† (W)	TF, R
<i>Melanerpes candidus</i> *	White Woodpecker	VR		P	N
<i>Melanerpes cruentatus</i>	Yellow-tufted Woodpecker	C	C	A†, P (M,X,W)	TF, TFe, R, N
<i>Veniliornis affinis</i>	Red-stained Woodpecker	FC	FC	X (M,X,W)	TF, R
* <i>Piculus flavigula</i>	Yellow-throated Woodpecker	FC	FC	X (M,X)	TF, R
<i>Piculus chrysocloros</i>	Golden-green Woodpecker	U	U	A, P (X)	R, TF
<i>Celeus grammicus</i>	Scale-breasted Woodpecker	FC	FC	X (M,X,W)	TF, R
<i>Celeus elegans</i>	Chestnut Woodpecker	U	U	X† (M,X)	TF, R
<i>Celeus flavus</i>	Cream-coloured Woodpecker	U	FC	X† (M,X,W)	R
<i>Celeus torquatus</i>	Ringed Woodpecker	U	U	X (M,X,W)	TF, R
<i>Dryocopus lineatus</i>	Lineated Woodpecker	FC	FC	A†, P (M,X,W)	TFe, R, N
<i>Campephilus rubricollis</i>	Red-necked Woodpecker	U	U	A†, P (M,X,W)	TF
<i>Campephilus melanoleucos</i>	Crimson-crested Woodpecker	FC	FC	A, P (M,W)	R, TFe, N
FALCONIDAE (falcons)					
<i>Herpetotheres cachinnans</i>	Laughing Falcon	FC	U	A, P (M,W)	N, R
<i>Micrastur ruficollis</i>	Barred Forest Falcon	U	U	X† (M)	TF
<i>Micrastur mintoni</i>	Cryptic Forest Falcon	U-FC	R	A†, P (M,X,W)	TF
<i>Micrastur mirandollei</i>	Slaty-backed Forest Falcon	R-U	U-R	A†, P (M,W)	TF
<i>Micrastur semitorquatus</i>	Collared Forest Falcon	R-U	R	A†, P (M,X,W)	TF
<i>Caracara plancus</i>	Southern Caracara	FC	U	P (W)	N
<i>Ibycter americanus</i>	Red-throated Caracara	FC	U	A†, P (M,X,W)	TF
<i>Daptrius ater</i>	Black Caracara	FC	U	A†, P (M,X,W)	R
<i>Milvago chimachima</i>	Yellow-headed Caracara	VR	R	S	N
<i>Falco sparverius</i>	American Kestrel	C	R	P (W)	N
<i>Falco rufigularis</i>	Bat Falcon	FC	FC-U	A†, P (M,W)	R, TF
<i>Falco femoralis</i> *	Aplomado Falcon	VR		P (W)	N
PSITTACIDAE (parrots)					
<i>Anodorhynchus hyacinthinus</i> *	Hyacinth Macaw	VR		P	PF, R
<i>Ara ararauna</i>	Blue-and-yellow Macaw	FC	FC	A, P (X,M)	R, PF, TF
<i>Ara macao</i>	Scarlet Macaw	FC	FC	A†, P (M,X,W)	TF
<i>Ara chloropterus</i>	Red-and-green Macaw	FC	U	A†, P (M,X,W)	TF
<i>Ara severus</i>	Chestnut-fronted Macaw	C	FC	A†, P (M,X,W)	R, PF, TF
<i>Orthopsittaca manilata</i>	Red-bellied Macaw	FC	U	A†, P (M,X,W)	PF, N
<i>Primolius maracana</i> *	Blue-winged Macaw	R-U		A, P (X,W)	TF (sd), N
<i>Aratinga leucophthalma</i>	White-eyed Parakeet	C	U	A†, P (M,W)	TF, N
<i>Pyrrhura perlata</i>	Crimson-bellied Parakeet	U-FC	U	A†, P (M,X,W)	TF
<i>Pyrrhura amazonum</i>	Santarém Parakeet	C	C	A†, P (M,X,W)	TF, TFe
<i>Forpus modestus</i>	Dusky-billed Parrotlet	U	U	A†, P (M,X,W)	TF, R

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<i>Brotogeris chrysoptera</i>	Golden-winged Parakeet	C	C	A, P (M,X,W)	TF
<i>Touit luctii</i> *	Scarlet-shouldered Parrotlet	R		A (X)	TF
<i>Pionites leucogaster</i>	White-bellied Parrot	FC	FC	A+, P (M,X,W)	TF
<i>Deroptys accipitrinus</i>	Red-fan Parrot	U-FC	U-FC	A+, P (M,X,W)	TF
<i>Pyrilia barrabandi</i>	Orange-cheeked Parrot	U	U	A, P (M,X,W)	TF, R
<i>Pyrilia aurantiocephala</i> *	Bald Parrot	VR		P (W)	TF, R
<i>Pionus meustruus</i>	Blue-headed Parrot	C	C	A+, P (M,X,W)	TF, R
<i>Amazona ochrocephala</i>	Yellow-crowned Parrot	FC	FC	A+, P (M,X,W)	TF, N
<i>Amazona kawalli</i> *	Kawall's Parrot	FC		A+, P (M,X,W)	R, TF
<i>Amazona farinosa</i>	Mealy Parrot	FC	U	A, P (M,X,W)	TF
<i>Amazona amazonica</i>	Orange-winged Parrot	U	U	X (M,W)	N, TFe, S
THAMNOPHILIDAE (typical antbirds)					
<i>Cymbilaimus lineatus</i>	Fasciated Antshrike	FC	FC-C	X+ (M,X,W)	TF, R
<i>Taraba major</i>	Great Antshrike	FC	FC	A+, P (M,W)	S, N, R
<i>Sakesphorus luctuosus</i>	Glossy Antshrike	U-FC	U	A+ (M,X,W)	R, S
<i>Thamnophilus doliatus</i> *	Barred Antshrike	FC		A, P (X,W)	R, S, N
<i>Thamnophilus palliatus</i>	Chestnut-backed Antshrike	FC	FC	A+, P (M,X,W)	TF (b), R
<i>Thamnophilus schistaceus</i>	Plain-winged Antshrike	FC	FC-C	X+ (M,X,W)	TF, R
<i>Thamnophilus stictocephalus</i>	Natterer's Slaty Antshrike	FC	FC	A+, P (M,X)	TFe (sd)
<i>Thamnophilus aethiops</i>	White-shouldered Antshrike	U	U	A+, P (M,X)	TF, TFe, S
<i>Thamnophilus amazonicus</i>	Amazonian Antshrike	FC	U-FC	X+ (M,X,W)	R, TF (b)
<i>Thamnomanes saturninus</i>	Saturnine Antshrike	U	U	X‡ (M,X,W)	TF
<i>Thamnomanes caesius</i>	Cinereous Antshrike	C	C	X+ (M,X,W)	TF, R
<i>Isleria hauzwelli</i>	Plain-throated Antwren	FC	C	X+ (M,X,W)	TF, R
<i>Pygiptila stellaris</i>	Spot-winged Antshrike	FC	FC	X+ (M,X,W)	TF, R
<i>Epinecrophylia leucophthalma</i>	White-eyed Antwren	FC	FC	X+ (M,X,W)	TF, R
<i>Epinecrophylia ornata</i>	Ornate Antwren	FC	FC	X+ (M,X,W)	R, TF (b)
<i>Myrmotherula brachyura</i>	Pygmy Antwren	C	C	A+, P (M,X)	TF, R
<i>Myrmotherula sclateri</i>	Sclater's Antwren	FC	FC	A‡, P (M,X,W)	TF, R
<i>Myrmotherula nullostriata</i>	Amazonian Streaked Antwren	FC	FC	A+, P (M,X,W)	R
<i>Myrmotherula axillaris</i>	White-flanked Antwren	U	U-R	X+ (M,X,W)	TF, R (b)
<i>Myrmotherula longipeunis</i>	Long-winged Antwren	FC	FC	X+ (M,X)	TF, R
<i>Myrmotherula menetriesii</i>	Grey Antwren	FC	FC-C	A (M,X)	TF, R
<i>Dichrozona cincta</i> *	Banded Antbird	VR		A+, P (M,X,W)	TF
<i>Herpsilochmus rufimarginatus</i>	Rufous-winged Antwren	U-FC	U-FC	A+ (M,X,W)	R, TF, TFe
<i>Microrhopias quixensis</i>	Dot-winged Antwren	FC	FC	A+, P (M,X)	TF, R (b/v)
<i>Formicivora grisea</i>	White-fringed Antwren	U	R	A, P (M,X)	S, TFe (sd)
<i>Drymophila devillei</i>	Striated Antbird	U	FC	A+, P (M,X,W)	TF (b)

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<i>Hypocnemis striata</i>	Spix's Warbling Antbird	FC-C	FC-C	X† (M,X)	TF, R
<i>Hypocnemis hypoxantha</i> *	Yellow-browed Antbird	VR		A, P (X,W)	TF (sd)
<i>Cercomacra cinerascens</i>	Grey Antbird	C	C	X† (M,X)	TF, R
<i>Cercomacra nigrescens</i>	Blackish Antbird	FC	FC-C	X† (M,X,W)	TF, S
<i>Cercomacra manu</i>	Manu Antbird	U	FC	X† (M,X)	TF (b)
<i>Pyriglena leuconota</i>	White-backed Fire-eye	U	U	A†, P (M,X)	TF, R
* <i>Myrmoborus leucophrys</i>	White-browed Antbird	FC	FC	X† (M,X,W)	R, TF (b), S
<i>Myrmoborus myotherinus</i>	Black-faced Antbird	FC	U	X† (M,X,W)	TF, R
<i>Hypocnemoides maculicauda</i>	Band-tailed Antbird	FC	U-FC	X† (M,X,W)	R
<i>Sclateria naevia</i>	Silvered Antbird	U	U	X (M,X,W)	R
<i>Schistocichla rufifacies</i> *	Rufous-faced Antbird	U		A† (M,X)	TF, R
<i>Myrmeciza hemimelaena</i>	Chestnut-tailed Antbird	U-FC	U	X† (M,X,W)	TF, R
<i>Myrmeciza atrothorax</i>	Black-throated Antbird	C	C – west, R – east	A†, P (M,X)	R, TFe, S
<i>Myrmornis torquata</i>	Wing-banded Antbird	R	R	A†, P (M,X)	TF
<i>Rhegmatorhina gymnops</i>	Bare-eyed Antbird	U	U	X† (M,X,W)	TF (aa)
<i>Hylophylax naevius</i>	Spot-backed Antbird	FC	FC	X† (M,X,W)	TF, R
<i>Hylophylax punctulatus</i>	Dot-backed Antbird	U	U-R	X† (M,X,W)	R
<i>Willisornis poecilinotus</i>	Common Scale-backed Antbird	U-FC	U-FC	X† (M)	TF, R
<i>Willisornis vidua</i> *	Xingu Scale-backed Antbird	U-FC	U-FC	X† (M,X)	TF, R
<i>Phlegopsis nigromaculata</i>	Black-spotted Bare-eye	FC	FC	X† (M,X,W)	TF, R (aa)
CONOPOPHAGIDAE (gnateaters)					
<i>Conopophaga aurita</i>	Chestnut-belted Gnateater	U	R	X† (M,X,W)	TF
GRALLARIIDAE (antpittas)					
<i>Grallaria varia</i>	Variagated Antpitta	U	U-FC	A, P (M)	TF, R
<i>Hylopezus macularius</i>	Spotted Antpitta	U	U-FC	A†, P (M,X,W)	TF
<i>Hylopezus berlepschi</i>	Amazonian Antpitta	U	U	A†, P (M,X)	TF (b), S
<i>Myrmothera campanisona</i>	Thrush-like Antpitta	U	U	A†, P (M,X,W)	TF
FORMICARIIDAE (antthrushes)					
<i>Formicarius colma</i>	Rufous-capped Antthrush	FC	FC	X† (M,X)	TF
<i>Formicarius analis</i>	Black-faced Antthrush	FC	FC	X† (M)	R, TF
<i>Chamaeza nobilis</i>	Striated Antthrush	R	R-U	X† (M,X)	TF
FURNARIIDAE (ovenbirds)					
<i>Sclerurus mexicanus</i>	Tawny-throated Leaf Tosser	U	U	A† (M,X)	TF
<i>Sclerurus rufularis</i>	Short-billed Leaf Tosser	U	U	X† (M,X)	TF
<i>Sclerurus caudacutus</i>	Black-tailed Leaf Tosser	U	U	X† (M,X,W)	TF
<i>Sclerurus albigularis</i>	Grey-throated Leaf Tosser	VR	R	A† (M,X)	TF
<i>Certhiasomus stictolaemus</i>	Spot-throated Woodcreeper	R-U	R	X† (M,X,W)	TF
<i>Dendrocincla fuliginosa</i>	Plain-brown Woodcreeper	FC	U	X (M)	TF, R (aa)

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<i>Dendrocincla merula</i> *	White-chinned Woodcreeper	U–FC	overlooked	X+ (X,W)	TF, R (aa)
<i>Sittasomus griseicapillus</i>	Olivaceous Woodcreeper	U	U	X+ (M)	TF, R
<i>Deconychura longicauda</i>	Long-tailed Woodcreeper	U	U	X+ (M,X)	TF, R
<i>Glyphorynchus spirurus</i>	Wedge-billed Woodcreeper	FC	FC	X† (M,X,W)	TF, R
<i>Dendrexetastes rufigula</i>	Cinnamon-throated Woodcreeper	U–FC	U–FC	X+ (M,X,W)	TF, TFe
<i>Nasica longirostris</i>	Long-billed Woodcreeper	FC	U–FC	X+ (M,X,W)	R
<i>Dendrocolaptes certhia</i>	Amazonian Barred Woodcreeper	U–FC	U	X+ (M,X)	TF
<i>Dendrocolaptes picumnus</i>	Black-banded Woodcreeper	U	R	A, P (M,X,W)	TF (aa)
<i>Hylexetastes perrotii</i>	Red-billed Woodcreeper	R	R	X+ (M,X)	TF
<i>Xiphocolaptes promeropirhynchus</i>	Strong-billed Woodcreeper	U	U	A†, P (M,X)	TF
<i>Xiphorhynchus obsoletus</i>	Striped Woodcreeper	FC	U–FC	X+ (M,X)	R
<i>Xiphorhynchus elegans</i> *	Elegant Woodcreeper	FC	C (as <i>X. spixii</i> / <i>elegans</i>)	X+ (M)	TF
<i>Xiphorhynchus spixii</i>	Spix's Woodcreeper	FC	C (as <i>X. spixii</i> / <i>elegans</i>)	X+ (M,X)	TF
<i>Xiphorhynchus guttatus</i>	Buff-throated Woodcreeper	FC	C	X+ (M,X,W)	TF, R
<i>Dendroplex picus</i>	Straight-billed Woodcreeper	FC–C	FC–C	X+ (M,X,W)	R, TFe, N
<i>Campylorhamphus procurvoides</i>	Curve-billed Scythebill	U	U–FC	X+ (M,X)	TF (b)
<i>Lepidocolaptes albolineatus</i>	Lineated Woodcreeper	FC	FC	X (M,X,W)	TF, R
<i>Xenops tenuirostris</i> *	Slender-billed Xenops	R		A, P (M,X)	R
<i>Xenops minutus</i>	Plain Xenops	FC	FC	X (M,X)	TF, R
<i>Xenops rutilans</i>	Streaked Xenops	U	R	A, P (M)	TF (sd)
<i>Berlepschia rikeri</i>	Point-tailed Palmcreeper	U	R	A, P (X,W)	PF
<i>Microxenops milleri</i>	Rufous-tailed Xenops	R–U	R	A (X)	TF
<i>Anabazenops dorsalis</i>	Dusky-cheeked Foliage-gleaner	U	FC	A† (M,X,W)	TF (b)
<i>Philydor erythrocerum</i>	Rufous-rumped Foliage-gleaner	FC	FC	A†, P (M,X,W)	TF, R
<i>Philydor erythropteryum</i>	Chestnut-winged Foliage-gleaner	FC	FC	A (M,X)	TF, R
<i>Philydor pyrrhodes</i> *	Cinnamon-rumped Foliage-gleaner	R		X (M,X,W)	R, TF
<i>Anabacerthia ruficaudatum</i>	Rufous-tailed Foliage-gleaner	U	U	A (M,X)	TF, R
<i>Syndactyla ucayalae</i>	Peruvian Recurvebill	R	U	A† (M,X)	TF (b)
<i>Ancistrops strigilatus</i>	Chestnut-winged Hookbill	FC	FC	A†, P (M,X)	TF, R
<i>Hyloctistes subulatus</i>	Striped Woodhaunter	U	U	X (M,X)	TF, R
<i>Automolus ochrolaemus</i>	Buff-throated Foliage-gleaner	FC	U–FC	X+ (M,X)	TF, R
<i>Automolus paraensis</i>	Pará Foliage-gleaner	U–FC	U–FC	X+ (M,X)	TF
<i>Automolus rufipileatus</i>	Chestnut-crowned Foliage-gleaner	FC	FC	X+ (M,X)	R, TF (b)

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<i>Cranioleuca vulpina</i>	Rusty-backed Spinetail	FC	U	A (M,X)	R
<i>Cranioleuca gutturata</i>	Speckled Spinetail	U	U	A+ (M,X)	R
<i>Synallaxis gujanensis</i>	Plain-crowned Spinetail	U	R	A+, P (M,X,W)	R, S
<i>Synallaxis cabanisi</i>	Cabanis's Spinetail	VR	R	A+ (M)	TFe (b), S
<i>Synallaxis albescentis</i> *	Pale-breasted Spinetail	U		A (W)	N
<i>Synallaxis rutilans</i>	Ruddy Spinetail	U-FC	U	X, (M,X)	TF
* <i>Synallaxis cherriei</i>	Chestnut-throated Spinetail	U	U	A+, P (M,X)	TF (b),
TYRANNIDAE (tyrant flycatchers)					
<i>Tyrannulus elatus</i>	Yellow-crowned Tyrannulet	C	C	A, P (W)	TF, R, S, N
<i>Myiopagis gaimardii</i>	Forest Elaenia	C	C	A+, P (M,X,W)	TF, TFe, R, S
<i>Myiopagis caniceps</i>	Grey Elaenia	FC	U	A+, P (M,X)	TF, R
<i>Myiopagis viridicata</i>	Greenish Elaenia	R	U-R	A (W)	S, TFe / AM?
<i>Elaenia spectabilis</i>	Large Elaenia	VR	R	S	S / AM
<i>Elaenia parvirostris</i>	Small-billed Elaenia	U	R	A, P	TFe, S / AM
<i>Ornithion inermis</i>	White-lored Tyrannulet	FC	FC	A+, P (M,X,W)	TF, R
<i>Camptostoma obsoletum</i>	Southern Beardless Tyrannulet	FC	U	A+, P (M,X,W)	N, S
<i>Phaeomyias murina</i>	Mouse-coloured Tyrannulet	VR	R	A (W)	N, S
<i>Capsiempis flaveola</i>	Yellow Tyrannulet	FC	U	A+, P (M,X)	TFe (b)
<i>Corythopsis torquatus</i>	Ringed Antpipit	U	U	X+, P (M,X,W)	TF, R
<i>Zimmerius acer</i>	Guianan Tyrannulet	FC	U-FC	A, P (M,X,W)	TF, R
<i>Mionectes oleagineus</i>	Ochre-bellied Flycatcher	FC	U	X+ (M,X)	TF
<i>Leptopogon amaurocephalus</i>	Sepia-capped Flycatcher	U	U	X (X,W)	TF (b)
<i>Sublegatus obscurior</i> *	Amazonian Scrub Flycatcher	R		A, P (X,W)	TF
<i>Sublegatus modestus</i> *	Southern Scrub Flycatcher	R	R (as <i>Sublegatus</i> sp.)	A, P (W)	TF, S, N / AM
<i>Inezia inornata</i> *	Plain Tyrannulet	VR		A (X)	R, S, TFe / AM
<i>Inezia subflava</i> *	Amazonian Tyrannulet	U		A, P (X,W)	R
<i>Myiornis ecaudatus</i>	Short-tailed Pygmy Tyrant	FC	FC	X+ (M,X,W)	TF, TFe, R
<i>Lophotriccus galeatus</i>	Helmeted Pygmy Tyrant	FC	U	A+, P (M,X,W)	TF, R
<i>Hemitriccus minor</i>	Snethlage's Tody-Tyrant	FC	FC	X (M)	TF
<i>Hemitriccus griseipectus</i>	White-bellied Tody-Tyrant	U	U	X+ (M,X,W)	TF, R
<i>Hemitriccus minimus</i>	Zimmer's Tody-Tyrant	U	R-U	A, P (M,X,W)	R, TF (sd)
<i>Poecilatriccus latirostris</i> *	Rusty-fronted Tody-Flycatcher	FC	overlooked	A, P (M,X,W)	N
<i>Taeniotriccus andrei</i> *	Black-chested Tyrant	VR*	reidentified	A (M)	TF (b/v)
<i>Todirostrum maculatum</i>	Spotted Tody-Flycatcher	U	R	X (X,W)	S, N
<i>Todirostrum chrysocrotaphum</i>	Yellow-browed Tody-Flycatcher	U-FC	U	A, P (W)	TF, R
<i>Rhynchocyclus olivaceus</i>	Olivaceous Flatbill	R	R	A	TF, R
<i>Tolmomyias sulphurescens</i>	Yellow-olive Flycatcher	R-U	FC	A+ (M)	TF, R

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<i>Tolmomyias assimilis</i> *	Yellow-margined Flycatcher	FC		X (M,X)	TF
<i>Tolmomyias poliocephalus</i>	Grey-crowned Flycatcher	FC	U	A+ (M,X)	TF, R
<i>Tolmomyias flaviventris</i>	Yellow-breasted Flycatcher	U	U–R	A, P (M,X)	S, TFe (sd)
<i>Platyrinchus saturatus</i>	Cinnamon-crested Spadebill	R–U	R	X+ (M,X)	TF
<i>Platyrinchus coronatus</i>	Golden-crowned Spadebill	R–U	R	X (M,X)	TF
<i>Platyrinchus platyrhynchos</i>	White-crested Spadebill	U	U	X+ (M,X)	TF, R
<i>Onychorhynchus coronatus</i>	Royal Flycatcher	R–U	R	X (M,X,W)	TF, R
<i>Myiophobus fasciatus</i>	Bran-coloured Flycatcher	R	R	A	N / AM
<i>Myiobius barbatus</i>	Sulphur-rumped Flycatcher	U	U	X (W)	TF
<i>Terenotriccus erythrurus</i>	Ruddy-tailed Flycatcher	U–FC	U	X (M,X)	TF, R
<i>Neopipo cinnamomea</i> *	Cinnamon Neopipo	R		P	R
<i>Lathrotriccus euleri</i>	Euler's Flycatcher	FC	U	X+ (M,X)	TF, R
<i>Cnemotriccus fuscatus</i> *	Fuscous Flycatcher	R		A (M,X)	S / AM
<i>Contopus cooperi</i> *	Olive-sided Flycatcher	VR	overlooked	A	TF / BM
<i>Contopus virens</i> *	Eastern Wood Pewee	R		A (X)	TF / BM
<i>Pyrocephalus rubinus</i>	Vermilion Flycatcher	U	R–U	A, P (W)	N / UM*
<i>Ochthornis littoralis</i>	Drab Water Tyrant	U	U	X+ (M,W)	R
<i>Satrapa icterophrys</i> *	Yellow-browed Tyrant	VR		P	N / AM
<i>Muscisaxicola fluvialis</i> *	Little Ground Tyrant	VR		P (W)	R
<i>Fluvicola albiventer</i>	Black-backed Water Tyrant	R	R	S	R, W
<i>Colonia colonus</i>	Long-tailed Tyrant	FC	U	A+, P (M,W)	TF, R
<i>Legatus leucophaeus</i>	Piratic Flycatcher	C	FC	A, P (M,W)	N, TF, R / UM*
<i>Myiozetetes cayanensis</i>	Rusty-margined Flycatcher	C	FC	A+, P (M,X)	N, R, TFe
<i>Myiozetetes luteiventris</i>	Dusky-chested Flycatcher	U	U	A, P (M,X,W)	TF
<i>Pitangus sulphuratus</i>	Great Kiskadee	C	U	A, P (W)	N, TFe, S
<i>Pitangus lictor</i>	Lesser Kiskadee	U–FC	U	A+, P (M,X,W)	R, W
<i>Myiodynastes maculatus</i>	Streaked Flycatcher	U	R–U	A, P	TFe (sd), S, N / AM*
<i>Megarynchus pitangua</i> *	Boat-billed Flycatcher	U		A, P (W)	TF, N, S / AM*
<i>Tyrannopsis sulphurea</i>	Sulphury Flycatcher	U	R	A, P (M,W)	PF
<i>Empidonomus varius</i>	Variegated Flycatcher	FC	U	X (W)	N, TFe, TF / AM*
<i>Empidonomus aurantioatrocristatus</i>	Crowned Slaty Flycatcher	R–U	R	A, P (W)	TFe (sd), S / AM
<i>Tyrannus albogularis</i>	White-throated Kingbird	R–U	R–U	A, P (W)	N / AM
<i>Tyrannus melancholicus</i>	Tropical Kingbird	C	FC	A, P (W)	N / AM*
<i>Tyrannus savana</i>	Fork-tailed Flycatcher	FC	U	A, P (W)	N / AM
<i>Rhytipterna simplex</i>	Greyish Mourner	FC	FC	X (X,W)	TF, R
<i>Sirystes sibilator</i>	Sirystes	R	U	A, P (M,X,W)	TF
<i>Casiornis rufus</i>	Rufous Casiornis	R–U	R	A, P (X)	TF (sd) / AM?
<i>Myiarchus tuberculifer</i>	Dusky-capped Flycatcher	U–FC	U	A+, P (M,X)	TF, R

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<i>Myiarchus swainsoni</i> *	Swainson's Flycatcher	VR		X	TFe (sd), S, N / AM
<i>Myiarchus ferox</i>	Short-crested Flycatcher	FC	U	A+, P (M,W)	S, N, R
<i>Myiarchus tyrannulus</i>	Brown-crested Flycatcher	U	R	A+, P (M,X)	TF (sd)
<i>Ramphotrigon megacephalum</i>	Large-headed Flatbill	FC	FC	X+ (M,X)	TF (b)
<i>Ramphotrigon ruficauda</i>	Rufous-tailed Flatbill	U	R	X (X)	TF, R
<i>Ramphotrigon fuscicauda</i>	Dusky-tailed Flatbill	U	U	A+, P (M,X,W)	TF (b)
<i>Attila phoenicurus</i> *	Rufous-tailed Attila	VR		P (W)	TFe, R / AM
<i>Attila cinnamomeus</i>	Cinnamon Attila	FC	U-FC	X+ (M,X,W)	R
<i>Attila spadiceus</i>	Bright-rumped Attila	U-FC	U	X+ (M,X)	TF, R
COTINGIDAE (cotingas)					
<i>Phoenicircus nigricollis</i> *	Black-necked Red Cotinga	VR	R	A	TF
<i>Cephalopterus ornatus</i>	Amazonian Umbrellabird	U	U	X (W)	R
<i>Cotinga cayana</i>	Spangled Cotinga	U	U	X (W)	TF, R
<i>Lipaugus vociferans</i>	Screaming Piha	C	C	X+ (M,X,W)	TF, R
<i>Porphyrolaema porphyrolaema</i>	Purple-throated Cotinga	R	R	A+, P (W)	TF, R
<i>Xipholena punicea</i>	Pompadour Cotinga	R	U (as <i>Xipholena</i> sp.)	X (X,W)	TF, R
<i>Gymnoderus foetidus</i>	Bare-necked Fruitcrow	U-FC	U-FC	P (W)	R
PIPRIDAE (manakins)					
<i>Tyrannneutes stolzmanni</i>	Dwarf Tyrant-Manakin	FC	U	A+, P (M,X,W)	TF, R
<i>Chiroxiphia pareola</i>	Blue-backed Manakin	FC	FC	X+ (M,X,W)	TF, R
<i>Machaeropterus pyrocephalus</i>	Fiery-capped Manakin	U-FC	R-U	A+, P (M,W)	TF, R
<i>Dixiphia pipra</i> *	White-crowned Manakin	R		X (X,W)	TF, R
<i>Manacus manacus</i>	White-bearded Manakin	U	R-U	X	S, TFe
<i>Heterocercus linteatus</i>	Flame-crowned Manakin	U	R	X+ (M,X,W)	R
<i>Ceratopipra rubrocapilla</i>	Red-headed Manakin	C	FC	X+ (M,X,W)	TF, R
<i>Pipra fasciicauda</i>	Band-tailed Manakin	FC	FC	X (X,W)	TF, R (b)
<i>Lepidothrix nattereri</i>	Snow-capped Manakin	U-FC	U	X+ (M,X,W)	TF, R
TITYRIDAE (tityras)					
<i>Tityra inquisitor</i>	Black-crowned Tityra	U	R-U	A+, P (M,W)	TF, R
<i>Tityra cayana</i>	Black-tailed Tityra	R	U	A+, P (M)	TF, R
<i>Tityra semifasciata</i>	Masked Tityra	FC	FC	A+, P (M,X,W)	TF, R, N
<i>Schiffornis major</i>	Várzea Schiffornis	R-U	R	X+ (M,X,W)	R
<i>Schiffornis turdina</i>	Brown-winged Schiffornis	FC	FC	X+ (M,X)	TF, R
<i>Laniocera hypopyrra</i>	Cinereous Mourner	U	U	X+ (M,X)	TF
<i>Iodopleura isabellae</i>	White-browed Purpletuft	U	R-U	A, P (M,X,W)	TFe, R
<i>Xenopsaris albinucha</i>	White-naped Xenopsaris	R	R	A, P (W)	TF (sd)/ AM

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<i>Pachyramphus castaneus</i>	Chestnut-crowned Becard	FC	U	A+ (M,W)	TF, R
<i>Pachyramphus polychopterus</i>	White-winged Becard	FC	U	A+, P (M)	R
<i>Pachyramphus marginatus</i>	Black-capped Becard	FC	FC	A+ (M,X)	TF, R
<i>Pachyramphus minor</i>	Pink-throated Becard	U	U	X (X)	TF, R
<i>Pachyramphus validus*</i>	Crested Becard	VR		A, P (W)	TFe (sd) / AM
INCERTAE SEDIS					
<i>Piprites chloris</i>	Wing-barred Piprites	FC	FC	A+ (M,X)	TF, R
VIREONIDAE (vireos)					
<i>Cyclarhis guianensis</i>	Rufous-browed Peppershrike	FC	U	A+, P (M)	TF, R, S, N
<i>Vireolanius leucotis</i>	Slaty-capped Shrike-Vireo	FC-C	FC-C	A+, P (M,X,W)	TF, R
<i>Virco olivaceus</i>	Red-eyed Vireo	U-FC	U	X	TF, TFe / BM / AM*
<i>Virco altiloquus</i>	Black-whiskered Vireo	R	R	S	TF, R / BM
<i>Hylophilus semicinctus</i>	Grey-chested Greenlet	FC	FC	A+, P (M,X,W)	TF, R
<i>Hylophilus hypoxanthus</i>	Dusky-capped Greenlet	FC-C	C	X (M,X,W)	TF, R
<i>Hylophilus ochraceiceps</i>	Tawny-crowned Greenlet	U	FC	A (M,X)	TF, R
HIRUNDINIDAE (swallows)					
<i>Pygochelidon melanoleuca*</i>	Black-collared Swallow	U-R		P (W)	R
<i>Atticora fasciata</i>	White-banded Swallow	C	FC	A+, P (W)	R
<i>Atticora tibialis</i>	White-thighed Swallow	R-U	R	A, P	TF
<i>Stelgidopteryx ruficollis</i>	Southern Rough-winged Swallow	C	C	X+ (W)	R, W, N
<i>Progne tapera</i>	Brown-chested Martin	FC	U-FC	P (W)	W, R, N (ae)
<i>Progne subis*</i>	Purple Martin	U		P (W)	N, R (ae) / BM
<i>Progne chalybea</i>	Grey-breasted Martin	C	U-FC	A, P (W)	N (ae) / AM*
<i>Tachycineta albiventer</i>	White-winged Swallow	U	FC	A+, P (X,W)	W, R
<i>Riparia riparia*</i>	Bank Swallow	VR		S	N, R (ae) / BM
<i>Hirundo rustica*</i>	Barn Swallow	R		S	N (ae) / BM
TROGLODYTIDAE (wrens)					
<i>Microcerculus marginatus</i>	Scaly-breasted Wren	FC	FC	X+ (M,X)	TF
<i>Odontorchilus cinereus</i>	Tooth-billed Wren	U	U	A+, P (M,X,W)	TF
<i>Troglodytes aedon</i>	House Wren	C	C	A, P (M,W)	N
<i>Campylorhynchus turdinus</i>	Thrush-like Wren	FC	FC	X+ (M,W)	TF, R
<i>Pheugopedius genibarbis</i>	Moustached Wren	FC	FC	A+, P (M)	TF, R
<i>Cantorchilus leucotis</i>	Buff-breasted Wren	C	FC-C	X+ (M,X,W)	R, N
<i>Cyphorhinus arada</i>	Musician Wren	U	R	X+ (M,X,W)	TF
POLIOPTILIDAE (gnatcatchers)					
<i>Ramphocaenus melanurus</i>	Long-billed Gnatwren	FC	FC	X+ (M,X)	R, TF
<i>Polioptila guianensis</i>	Guianan Gnatcatcher	R	R	A, P (X)	TF

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DONACOBIIDAE (Donacobius)					
<i>Donacobius atricapilla</i>	Black-capped Donacobius	FC	R	A+, P (M,W)	W, R, N
TURDIDAE (thrushes)					
<i>Catharus fuscescens</i> *	Veery	VR		X	TF / BM
<i>Turdus hauxwelli</i>	Hauxwell's Thrush	U–FC	U (as <i>T. hauxwelli</i> / <i>fumigatus</i>)	X+ (M,X)	R
<i>Turdus lawrencii</i>	Lawrence's Thrush	U	U	A+ (M,X)	TF
<i>Turdus amaurochalinus</i>	Creamy-bellied Thrush	VR*	U–R	S	S, R / AM
<i>Turdus albicollis</i>	White-necked Thrush	U	U	X+ (M)	TF, R
MOTACILLIDAE (pipits and wagtails)					
<i>Anthus lutescens</i> *	Yellowish Pipit	U		A, P (W)	N
THRAUPIDAE (tanagers)					
<i>Paroaria gularis</i>	Red-capped Cardinal	FC	U–FC	P (W)	R
<i>Schistochlamys melanopis</i> *	Black-faced Tanager	VR		P	TF (sd)
<i>Cissopis leverianus</i>	Magpie Tanager	U–FC	U	A+, P (M)	TF, R
<i>Lamprospiza melanoleuca</i>	Red-billed Pied Tanager	U	FC	A+, P (M,X,W)	TF, R
<i>Nemosia pileata</i>	Hooded Tanager	VR	R	S	TF (sd)
<i>Tachyphonus cristatus</i>	Flame-crested Tanager	FC	C	X (M,X,W)	TF, R
<i>Tachyphonus luctuosus</i>	White-shouldered Tanager	FC	FC	X (M,W)	TF, R
<i>Tachyphonus rufus</i> *	White-lined Tanager	U		A, P (W)	N
<i>Lanio versicolor</i>	White-winged Shrike-Tanager	FC	FC	A+, P (M,X,W)	TF, R
<i>Ramphocelus carbo</i>	Silver-beaked Tanager	C	FC	A, P (W)	N, R, S, TFe
<i>Thraupis episcopus</i>	Blue-grey Tanager	C	U (as <i>T. episcopus</i> / <i>sayaca</i>)	A, P (M,W)	N
<i>Thraupis palmarum</i>	Palm Tanager	C	FC–C	A+, P (M,X,W)	N, S, TFe
<i>Tangara nigrocincta</i>	Masked Tanager	U	U–R	A+, P (M,X,W)	TF, TFe
<i>Tangara cyanicollis</i>	Blue-necked Tanager	U	U	A+, P (M,W)	TF, TFe
<i>Tangara varia</i> *	Dotted Tanager	VR		A	TF
<i>Tangara punctata</i>	Spotted Tanager	U	R	A	TF, R
<i>Tangara mexicana</i>	Turquoise Tanager	FC	FC	A+, P (M,W)	TF, R, TFe, S
<i>Tangara chilensis</i>	Paradise Tanager	FC	C	A, P (M,X,W)	TF, R
<i>Tangara velia</i>	Opal-rumped Tanager	FC	FC	A (M,X,W)	TFe, TF, R
<i>Tangara gyrola</i>	Bay-headed Tanager	U–FC	U	A+, P (M,W)	TF, R
<i>Tangara schrankii</i>	Green-and-gold Tanager	FC	U	X (M,X,W)	TF, R
<i>Tersina viridis</i>	Swallow Tanager	FC	U–FC	A+, P (M,W)	TF, R / UM
<i>Dacnis albiventris</i>	White-bellied Dacnis	VR*	R	S	TF
<i>Dacnis lineata</i>	Black-faced Dacnis	FC	FC	A, P (X,W)	TF, R
<i>Dacnis flaviventer</i>	Yellow-bellied Dacnis	FC	FC	A+, P (M,X,W)	R, TF
<i>Dacnis cayana</i>	Blue Dacnis	FC	C	A (M,W)	TF, R
<i>Cyanerpes nitidus</i>	Short-billed Honeycreeper	U	U–R	A, P (X,W)	TF, R

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<i>Cyanerpes caeruleus</i>	Purple Honeycreeper	U-FC	U	A†, P (M,X,W)	TF, R
<i>Cyanerpes cyaneus</i> *	Red-legged Honeycreeper	VR		S	TF (sd)
<i>Chlorophanes spiza</i>	Green Honeycreeper	FC	U	A, P (WA)	TF, R
<i>Hemithraupis flavicollis</i>	Yellow-backed Tanager	FC	U-FC	A, P (X,W)	TF, R
<i>Conirostrum speciosum</i>	Chestnut-vented Conebill	U	R	A (W)	TF (sd)
<i>Volatinia jacarina</i>	Blue-black Grassquit	C	C	A, P (M,W)	N
<i>Sporophila collaris</i> *	Rusty-collared Seedeater	VR		P (W)	N
<i>Sporophila lincola</i> *	Lined Seedeater	C		P (W)	N / AM
<i>Sporophila nigricollis</i> *	Yellow-bellied Seedeater	U		A, P (W)	N
<i>Sporophila caeruleus</i>	Double-collared Seedeater	C	Rw m	A, P	N / AM
<i>Sporophila castaneiventris</i> *	Chestnut-bellied Seedeater	VR		P (W)	N
<i>Oryzoborus angolensis</i>	Chestnut-bellied Seed Finch	R-U	R	A†, P (W)	N
<i>Coryphospingus cucullatus</i> *	Red-crested Finch	VR		P	N
<i>Coereba flaveola</i>	Bananaquit	FC	U	A†, P (M,X)	TF, R, S, N
<i>Parkethraustes humeralis</i>	Yellow-shouldered Grosbeak	U	U	A†, P (M,X,W)	TF
INCERTAE SEDIS					
<i>Saltator grossus</i>	Slate-coloured Grosbeak	FC	FC-C	X† (M,W)	TF, R
<i>Saltator maximus</i>	Buff-throated Saltator	C	FC-C	X† (M,W)	TF, R, S, N
<i>Saltator coerulescens</i> *	Greyish Saltator	C		A, P	S, N
EMBERIZIDAE (sparrows)					
<i>Zonotrichia capensis</i> *	Rufous-collared Sparrow	FC		A, P (W)	N
<i>Ammodramus humeralis</i> *	Grassland Sparrow	FC		A, P (X,W)	N
<i>Arremon taciturnus</i>	Pectoral Sparrow	FC	FC	X† (M,X)	TF, R
CARDINALIDAE (cardinal grosbeaks)					
<i>Habia rubica</i>	Red-crowned Ant Tanager	U-FC	U-FC	A†, P (M,X)	TF, R
<i>Granatellus pelzelni</i>	Rose-breasted Chat	U-FC	FC	A†, P (M,X,W)	TF, B
<i>Cyanocompsa cyanooides</i>	Blue-black Grosbeak	FC	FCw	X† (M,X)	TF, R, S
PARULIDAE (wood warblers)					
<i>Geothlypis aequinoctialis</i> *	Masked Yellowthroat	VR		S	W, N
<i>Basilenternus culicivorus</i>	Golden-crowned Warbler	U	U	A† (M)	TF (sd)
<i>Phacothlypis fulvicauda</i> *	Buff-rumped Warbler	R		A	R
<i>Phacothlypis rivularis</i>	Riverbank Warbler	R	U	A† (M)	R
ICTERIDAE (New World blackbirds)					
<i>Psarocolius decumanus</i>	Crested Oropendola	C	FC	A†, P (M,X,W)	TF, R, N
<i>Psarocolius bifasciatus</i>	Olive Oropendola	C	FC-C	X† (M,X,W)	TF, R
<i>Cacicus solitarius</i>	Solitary Black Cacique	U	Rw	S	R, N
<i>Cacicus cela</i>	Yellow-rumped Cacique	C	U-FC	A†, P (M,W)	R, TF, S, N
<i>Cacicus haemorrhous</i>	Red-rumped Cacique	U	R	X† (M)	TF, R
<i>Icterus cayanensis</i>	Epaulet Oriole	U	U	A†, P (M,X,W)	TF, R
<i>Gnorimopsar chopi</i> *	Chopi Blackbird	VR		A	N

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<i>Molothrus oryzivorus</i>	Giant Cowbird	FC	R	A, P (M,W)	N, TF
<i>Molothrus bonariensis</i> *	Shiny Cowbird	U		A, P (W)	N
<i>Sturnella militaris</i> *	Red-breasted Blackbird	FC		A, P (W)	N
FRINGILLIDAE (finches)					
<i>Euphonia chlorotica</i> *	Purple-throated Euphonia	U		A (X)	N
<i>Euphonia laniirostris</i> / <i>violacea</i>	Thick-billed / Violaceous Euphonia	U	R	A (M,W)	TF, N
<i>Euphonia chrysopasta</i>	Golden-bellied Euphonia	FC	FC	A†, P (M,W)	TF, R
<i>Euphonia minuta</i>	White-vented Euphonia	R–U	U–R	A† (M,X,W)	TF, R
<i>Euphonia xanthogaster</i>	Orange-bellied Euphonia	U	U	A† (M)	TF (sd)
<i>Euphonia rufiventris</i>	Rufous-bellied Euphonia	FC	FC	A, P (M,X,W)	TF, R
PASSERIDAE (Old World sparrows)					
<i>Passer domesticus</i>	House Sparrow	C	Rw	P (W)	N

A taxonomic revision of the Subalpine Warbler *Sylvia cantillans*

by Lars Svensson

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SUMMARY.—Recent research on Subalpine Warbler *Sylvia cantillans* taxonomy is summarised, resulting in the recommendation to split the complex into three different species: Western Subalpine Warbler *S. inornata*, Eastern Subalpine Warbler *S. cantillans* and Moltoni's Warbler *S. subalpina*. One consequence of this is that the name *cantillans* needs to be fixed by the selection of a neotype, and the Franco-Iberian population requires a new name.

It has become apparent to careful observers that the Subalpine Warbler *Sylvia cantillans* is best treated as three separate species. All three occur in Italy and can be distinguished both vocally and in the hand, and usually also in the field at least for adult males. Moreover, there is evidence of sympatric breeding by two of the taxa without evidence of mixed pairs, and all three can be separated genetically. Various aspects of this situation were described by Orlando (1939), Gargallo (1994), Shirihai *et al.* (2001) and Brambilla *et al.* (2006, 2008b, 2010). However, these findings are now examined in the wider context of a 'species group' so that steps can be taken to ensure that names are applied to each discrete population, properly anchored to their type specimens and type localities. This is complicated by the belief that type material pertaining to the name *cantillans* apparently no longer exists and the original type locality 'Italy' is insufficiently precise. Other names applied to populations of the broader species also require attention, and my research has demonstrated that one population requires naming.

Populations and nomenclature

One group within the *S. cantillans* complex differs more markedly, Moltoni's Warbler *S. subalpina*. This breeds in Mallorca, Cabrera, Corsica, Sardinia and much of northern mainland Italy, mainly in Toscana and Emilia-Romagna. It differs clearly in call (Orlando 1939, Gargallo 1994) and subtly in song (Brambilla *et al.* 2008a; pers. obs.); the underparts of spring males are pinkish, invariably different from the orange-red or deeper brick-red of males in other populations, and it has a different moult strategy related to, among other things, later spring arrival (Gargallo 1994). There is also a substantial genetic difference (Shirihai *et al.* 2001, Brambilla *et al.* 2008b). Thus, few authorities today would question the wisdom of treating Moltoni's Warbler as a separate species.

The remaining range of the species complex is broad and discontinuous. It is evident from morphological, vocal and genetic differences that two species are involved. Both breed in Italy but are hardly in contact. One occupies the bulk of central and south Italy, including Sicily, Campania and Puglia, extending north at least to Emilia Romagna and Marche, occurring over much of the Apennine slopes. A subtly different subspecies occurs in extreme north-east Italy, the Balkans, Greece, Bulgaria and east to western Turkey.

The other species is established in a small northern enclave of Italy (western Liguria and Piemonte), where it is scarce if not rare (N. Baccetti *in litt.* 2013). This is also the common form in southern France and Iberia, and its range extends into north-west Africa, where it is represented by a subtly different subspecies.

These three parts of the Subalpine Warbler complex, on the evidence summarised below (for which extensive details will be published elsewhere; Svensson in press), deserve recognition as separate species.

I have dealt with the characters of Moltoni's Warbler above. The two remaining species, Western *S. inornata* and Eastern Subalpine Warbler *S. cantillans*, differ as follows. Genetically, there is a 3.7% difference in the mitochondrial cytochrome *b* gene (Brambilla *et al.* 2008b), which in the genus *Sylvia* is a level typical of different species. All post-juveniles and many juveniles differ in tail pattern, and furthermore *cantillans* shows stronger contrast between the rufous-red throat / breast and the more whitish lower flanks and belly (male Western is more uniformly reddish below). The white submoustachial stripe in males is on average broader and more prominent in Eastern Subalpine, narrower in Western (with only slight overlap). Eastern Subalpine averages slightly larger than Western. Vocal differences are slight; the call of Eastern is fuller and more compound, sometimes disyllabic, in Western invariably monosyllabic and drier. Slight differences in song appear to exist, but require more study before they can be evaluated.

The effect of this requires re-examination and clarification of all populations across the northern Mediterranean from Iberia to western Turkey, and those of north-west Africa. The result is a recommendation that three species be recognised as follows:

Western Subalpine Warbler *Sylvia inornata* Tschusi, 1906

Sylvia inornata inornata Tschusi, 1906. North-west Africa.

Sylvia inornata subsp. (Franco-Iberian subspecies, see below). Iberia, southern France, extreme north-west Italy.

Eastern Subalpine Warbler *Sylvia cantillans* (Pallas, 1764)

Sylvia cantillans cantillans (Pallas, 1764). Central and south Italy except Sardinia (for application of this name to this population, see below).

Sylvia cantillans albistriata (C. L. Brehm, 1855). Trieste, Balkans, Greece, Bulgaria, western Turkey.

Moltoni's Warbler *Sylvia subalpina* Temminck, 1820

Monotypic. Mallorca, Cabrera, Corsica, Sardinia, north mainland Italy.

Nomenclatural actions

Fixing the type locality of nominate *cantillans*.—In Pallas' text in Vroeg's Catalogue (1764), on p. 4 under no. 177, male and female '*Motacilla (cantillans)*' are described. The male is stated to have the underparts terracotta-coloured ('subtus testacea') and a little further on rufous ('subtus rufa') with the addition that the belly is white ('abdomine albo'). This description matches the birds breeding in central and south Italy. On p. 18 the type locality is given as 'Italy' ('Uit Italie'). This locality for the name *cantillans* combined with loss of its two type specimens (*vide* Baccetti *et al.* 2007; pers. requests to Tring, New York, Paris, Rome, Leiden, Berlin museums), and the presence in Italy of two taxa with very similar morphology, requires that a neotype be designated to fix the name *cantillans* to one taxon.

I designate a first-summer male collected on 23 May 1906 at Ficuzza, north-west Sicily, now in the Natural History Museum, Tring, BMNH 1909.11.18.50, as a neotype for *S. c. cantillans* Pallas, 1764. It was collected by Alphonse Robert, who sent material to various museums from as far afield as Europe and Brazil. Based on its collection date this bird was almost certainly a local breeder. Males usually arrive in central and southern Italy between late March and mid April, and breeding has almost invariably started by May.



Figure 1. Neotype (BMNH 1909.11.18.50) for Eastern Subalpine Warbler *Sylvia c. cantillans*, first-summer male, Ficuzza, north-west Sicily, Italy, 23 May 1906; note fairly obvious contrast between orange-red breast and more whitish lower flanks with only slight rusty tinge—not visible is the rather broad and prominent white submoustachial stripe (Hein Van Grouw / © Natural History Museum, Tring)



Figure 2. Neotype (BMNH 1909.11.18.50) of Eastern Subalpine Warbler *Sylvia c. cantillans*, first-summer male, Ficuzza, north-west Sicily, Italy, 23 May 1906; note typical tail pattern, with long, narrow whitish wedge on inner web of penultimate rectrix, while a few central tail feathers are missing and one is growing (Lars Svensson / © Natural History Museum, Tring)



Figure 3. Holotype (BMNH 1934.1.1.249) of Western Subalpine Warbler *Sylvia inornata iberiae*, adult male, El Pardo, Madrid, Spain, 24 May 1931; note fairly uniform orange-red underparts (apart from white central belly)—not visible is the rather narrow white submoustachial stripe (Mark Adams / © Natural History Museum, Tring)



Figure 4. Holotype (BMNH 1934.1.1.249) of Western Subalpine Warbler *Sylvia inornata iberiae*, note typical tail pattern with small square white tip to penultimate rectrix (Mark Adams / © Natural History Museum, Tring)

Art. 75.3 of the *International code of zoological nomenclature* (ICZN 1999) requires that any neotype is 'consistent with what is known of the former name-bearing type' and is 'as nearly as practicable from the original type locality'. In Pallas' (1764) original description, the male is described as being rufous or terracotta-coloured below, which fits two of the three species within the complex, but excludes Moltoni's Warbler, in which the male is pinkish below. Between the two other species, both of which have rufous underparts in males, mention of a white belly supports the interpretation that the birds breeding in central and south Italy are meant. Furthermore, birds similar to those breeding in Sicily are common and widespread over much of central and south Italy, as far north as the northern Apennines, whereas the other Italian taxon is rare and restricted to Liguria and Piemonte near the French border. It is therefore far more probable that it was the former taxon that Pallas described. Only one species in the complex breeds in Sicily, making this type locality unambiguous.

Birds breeding in central and south Italy differ from those in extreme north-west Italy (and in southern France and Iberia) in that males in breeding plumage display more contrast between the rufous or orange-red throat / breast and paler, more whitish rear flanks and belly. Males of the Franco-Iberian population are more uniform rufous-red below, contrasting less with the only moderately paler orange belly. In central and south Italy, adults and many first-years have a narrow white wedge on the inner web of the penultimate rectrix, whereas the Franco-Iberian population has a small square white tip to this feather, not a narrow wedge. The neotype displays both characters (Figs. 1–2), although because it is a first-summer male, the tail pattern is still immature and therefore less obvious. Morphological differences between the three groups will be treated in detail elsewhere (Svensson in press).

Description.—The neotype has a medium pale lead-grey head, nape and mantle, narrow reddish orbital ring, prominent white submoustachial stripe, uniform orange-red throat and breast, but considerably paler orange, more whitish lower flanks and belly (Fig. 2). Wings brown tinged greyish, with quite abraded tips and fringes to remiges, the rectrices being dark grey with large white portions on the outermost feather and a diffuse, whitish, long narrow wedge on the inner web of the penultimate feather. The pointed bill has a paler base. Legs pale, now dark straw-coloured. Wing length (max.) 63 mm and tail length 54 mm.

Naming the Franco-Iberian population.—From the above it follows that once the name *cantillans* is fixed to Eastern Subalpine Warbler, the oldest available valid name for any population of Western Subalpine Warbler is *inornata*, Tschusi, 1906, introduced for the North African population (type locality 'northern Tunisia'). Because the diagnosably distinct population breeding in Iberia, southern France and north-western Italy has not been named, following fixation of the name *cantillans* to the population elsewhere in Italy, I propose:

Sylvia inornata iberiae subsp. nov.

Holotype.—Adult male, BMNH 1934.1.1.249, collected by C. B. Ticehurst (orig. coll. no. 52: 22), at El Pardo, Madrid, Spain, on 24 May 1931. On the reverse of one label is written in pencil, presumably by Ticehurst, 'Breeding by river'. It is thus certain that the type was a local breeder.

Description.—Adult male has orange-red underparts, only subtly paler on belly and lower flanks, but central belly and undertail-coverts whitish. Upperparts from crown to uppertail lead-grey, wings slightly tinged brownish. Tertiaries dark-centred but narrowly fringed paler brown-grey. Orbital-ring orange-red. Submoustachial stripe pure white,

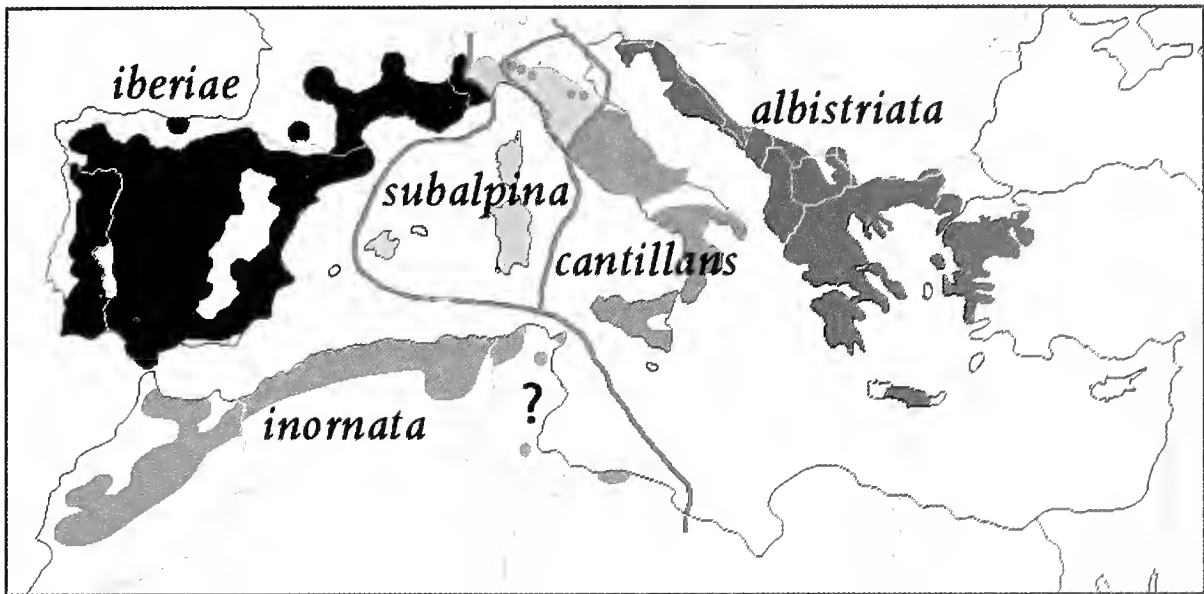


Figure 5. Map showing ranges of all five taxa and borders between the three species. Note that the circled area in northern Italy is a zone of overlap between *subalpina* and *cantillans*, with dark grey dots indicating localities of confirmed sympatry. The question mark in Tunisia denotes mainly lack of information concerning status within wide gaps between known breeding areas. Based mainly on Shirihai *et al.* (2001) and Brambilla *et al.* (2006), with input by M. Ullman (pers. comm. 2013).

rather narrow. Outer rectrices dark grey with large white outer portion (on average less extensive than in Eastern Subalpine Warbler), penultimate tail feathers squarely tipped white. Bill fine, culmen and tip dark, cutting edge and base of mandible paler (now pale yellowish brown). Wing (max.) 59.5 mm, tail 54.0 mm, bill (to skull) 12.6 mm, tarsus 19.5 mm. Figs. 3–4 show the type in ventral view and its tail pattern.

Female differs in being mainly whitish or cream-white below, with faint pinkish-buff or pale cinnamon-buff tinge in some. Upperparts brown-grey, slightly paler than male, lacking all or most lead-grey hues. Lores often slightly paler than forehead and crown (concolorous in male). Wings tinged slightly more brownish than in male. Either lacks white submoustachial stripe or has only faint suggestion of it. Female shares brick-red orbital ring, only less bright, but nearly always also has narrow off-white eye-ring outside orbital ring. Tail pattern as male.

Diagnosis.—Both sexes differ from nominate *inornata* in being less yellow-tinged above and below, which difference is particularly obvious in series. There is a slight tendency for breeders in southernmost Spain to be slightly more yellowish than typical birds from central Spain and further north (Shirihai *et al.* 2001), but differences are slight with much overlap, and it seems best to draw the line between *iberiae* and *inornata* through the Strait of Gibraltar, as in all major handbooks. In size and structure *iberiae* and *inornata* are practically alike, but *iberiae* is on average very slightly smaller, although differences are miniscule and unhelpful for identification. By comparing 57 specimens of *inornata* with 58 *iberiae* in various collections it is evident that at least 75% differ diagnosably, probably many more.

Etymology.—The name *iberiae*, a genitive singular, means ‘of Iberia’ and indicates the main range of this taxon, the Iberian Peninsula.

The scientific name of Moltoni's Warbler

Moltoni's Warbler has been known either as *subalpina* and *moltonii*. The latter name, given by Orlando in 1937, has been in wide use, but as Baccetti *et al.* (2007) pointed out *subalpina* is valid and has priority. The Temminck type specimen of *subalpina* is reputedly long since lost due to insect damage (*vide* Baccetti *et al.* 2007), and requests to the Leiden and Paris museums have not changed that.

The type was described (Temminck 1820b) as a female, but based on Temminck's plate (see below), its lead-grey upperparts and prominent pink underparts, I conclude that the specimen was a male. According to Temminck, the type had 'a beautiful vinaceous colour' below. The adjective used (Fr. 'vineuse', vinaceous) is the same that Ridgway (1912) used for such a pink, and because males of all other Subalpine Warbler populations possess more orange-brown or reddish underparts it is probable that Temminck was struck by the unusual and attractive pink of male Moltoni's Warbler when he described *subalpina*. In his Pl. 6, no. 2, a painting of *subalpina* shows an adult bird with lead-grey crown and mantle typical of males, and pink, not orange-red, underparts. Temminck specifically states that the bird in the said plate was the only known specimen, sent to Temminck by Bonelli, making it the holotype by monotypy. There can be no doubt that Temminck's plate refers to this taxon, making *subalpina* the oldest available valid name, with priority over *moltonii* Orlando, 1937.

That the type locality 'near Turin' could fit not only Moltoni's Warbler but theoretically also Eastern Subalpine Warbler is of subordinate importance given the existence of Temminck's plate and Temminck's (1820b) statement that the plate depicted the unique specimen. Furthermore, it clearly shows the characteristic tail pattern of Moltoni's Warbler, with the square white tips to the penultimate feathers excluding Eastern Subalpine Warbler.

Temminck published information on his *Sylvia subalpina* twice in 1820. First (Temminck 1820a) was the plate in August 1820, along with a wrapper giving the scientific name of this and other taxa depicted in the six plates comprising this part of the *Planches coloriées* of Temminck & Laugier, wherein Baron Laugier took no part in naming taxa (*cf.* Dickinson 2001). Second was a description in the *Manuel d'ornithologie* (Temminck 1820b), published in October 1820 (see item 3681 in the *Bibliographie de la France*, issue no. 43, of 21 October 1820).

Interestingly, Temminck (1824) depicted a perfectly identifiable Eastern Subalpine Warbler, presumably subspecies *albistriata*, in Pl. 251. The contrast between the dark rufous-red breast and white belly is striking. In the text the bird is labelled as the male *Sylvia subalpina*. The painting was based on a bird collected by a Mr Heckel in Silesia, Poland, near the German border (if correct, obviously a spring overshoot since the usual breeding range today runs south of the Alps east to south Bulgaria and western Turkey, and is not thought to have been substantially different then). However, Pl. 251 appeared four years later than Pl. 6 and does not depict the type of *subalpina*, which name must be linked to the bird on Pl. 6¹.

¹ It is interesting that the subject of Pl. 251 is mentioned in this text; evidence exists that the texts eventually published for livraisons 1–10 (all of the first 20 originally lacked text) appeared no later than June 1823 (*cf.* Dickinson 2001). Thus this text must be a reissue and the original text must have been cancelled (E. C. Dickinson *in litt.* 2013).

Ensuing taxonomy with synonymy

The effects of the above decisions in terms of synonymy are as follows. Fig. 5 maps species limits.

Western Subalpine Warbler *Sylvia inornata* Tschusi, 1906

Sylvia inornata inornata Tschusi, 1906. Type locality: northern Tunisia.

Sylvia inornata iberiae subsp. nov. Type locality: Madrid.

Eastern Subalpine Warbler *Sylvia cantillans* (Pallas, 1764)

Sylvia cantillans cantillans (Pallas, 1764). Type locality: Italy, but here restricted to Sicily.

Synonym: *leucopogon* Meyer, 1822. Type locality: Sicily.

Sylvia cantillans albistriata (C. L. Brehm, 1855) Type locality: Egypt (in winter).

Synonym: *orientalis* (A. E. Brehm, 1866). Type locality: Greece. *Nomen nudum*.

Moltoni's Warbler *Sylvia subalpina* Temminck, 1820 Type locality: near Turin.

Synonym: *moltonii* Orlando, 1937. Type locality: Sardinia (and Corsica?).

Other names have been associated with the Subalpine Warbler. Both *rhodogastra* (Rafinesque Schmaltz, 1810) and *turdella* (Rafinesque Schmaltz, 1810), described from Sicily, have been applied to this species in the broad sense, but according to Baccetti *et al.* (2007), neither of these names came into use. Furthermore, the first of these is more likely to refer to Spectacled Warbler *S. conspicillata* (Temminck 1820b) (see Trischitta 1922), and the second is apparently based on a female and probably impossible to definitively link to one taxon in the complex. Both names are best treated as *nomina dubia*. It may be desirable in the future to clarify the application of these names in order to stabilise the nomenclature of the genus *Sylvia*. However, this lies outside the scope of this paper.

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A range extension for Várzea Thrush *Turdus sanchezorum* in south-west Amazonia

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Várzea Thrush *Turdus sanchezorum* is a recently described cryptic species (O'Neill *et al.* 2011), the plumage of which is very similar to that of other species in the *T. hauxwelli* / *T. fumigatus* complex. This similarity resulted in the species remaining overlooked by field workers and museum-based ornithologists, who misidentified it for other *Turdus*. However, through the careful investigation of specimens, ornithologists recognised a distinct plumage in some individuals assigned to *T. hauxwelli*, in particular those collected in the Peruvian Amazon. These were identified as representing a 'grey-tailed morph' of *T. hauxwelli*, an illustration of which appears in Schulenberg *et al.* (2007). Subsequently, genetic and vocal studies confirmed that this form is a distinct species and the sister taxon of Unicoloured Thrush *Turdus haplochrous*, which is sympatric with *T. hauxwelli* in northern Bolivia (O'Neill *et al.* 2011).

O'Neill *et al.* (2011) reviewed material in several ornithological collections and mapped *T. sanchezorum* as having a relatively ample distribution in western Amazonia (Fig. 1), where it is associated primarily with *várzea* along the Solimões (Amazon) and its principal southern tributaries, including the Madeira and Purus, in Brazil, and the Ucayali, in Peru.

On 10 May 2010, a *T. sanchezorum* was captured in a mist-net in the Parque Zoobotânico of the Universidade Federal do Acre (PZ-UFAC; 09°57'S, 67°52'W; Fig. 1). The bird (Fig. 3) was fitted with a band inscribed with the code J33044. It weighed 68 g, had a wing length of 110 mm, inner rectrices 90 mm, tarsus 35 mm and total length 235 mm. It was subsequently released near the capture site. Comparison of photographs of this individual with the description of *T. sanchezorum* (O'Neill *et al.*, 2011) and a photograph of the species in the wild, kindly provided by G. H. Rosenberg, permitted confirmation of this taxon in the Brazilian state of Acre.

On 9 June 2007, a specimen of the genus *Turdus* (MPEG 63654; Fig. 2) was collected at the edge of a *várzea* forest on the left bank of the rio Acre, at Fazenda São Raimundo (09°57'S; 67°44'W), c.10 km east of Rio Branco, the capital of Acre. Initially identified as Hauxwell's Thrush *T. hauxwelli*,



Figure 1. The geographic distribution (grey lines and yellow spot) of Várzea Thrush *Turdus sanchezorum* as defined by O'Neill *et al.* (2011) and the new records from the Brazilian state of Acre. Star = Parque Zoobotânico, Rio Branco; triangle = Fazenda São Raimundo, on the left bank of the rio Acre.

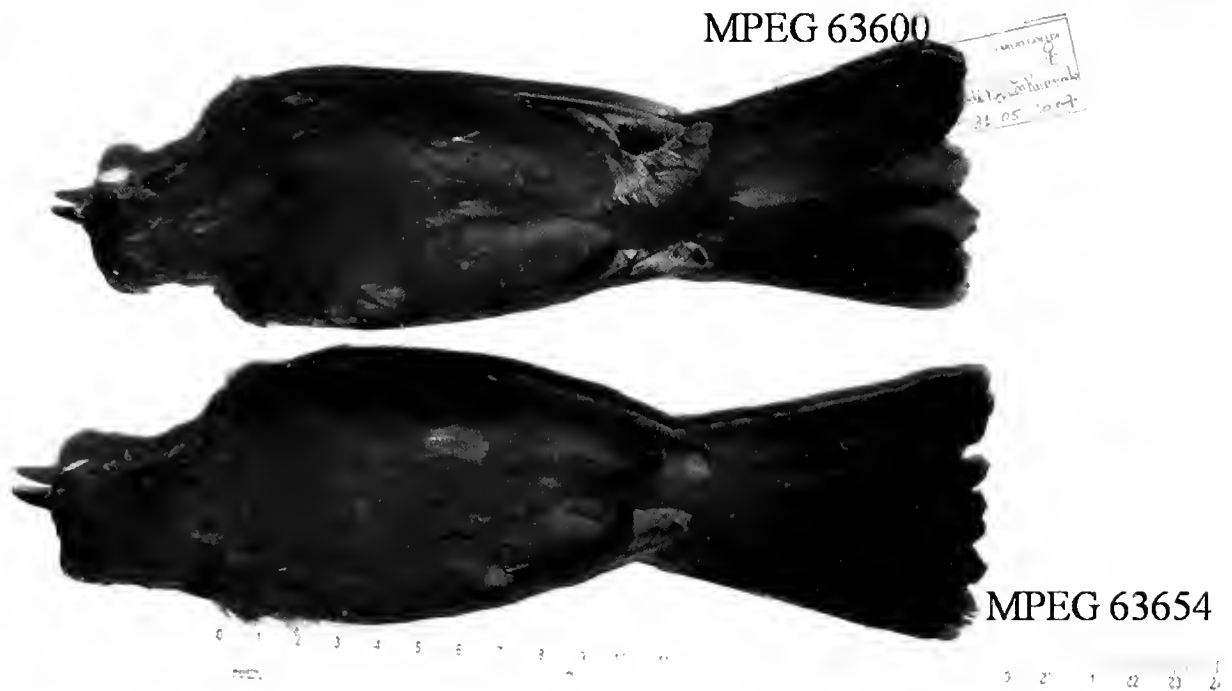


Figure 2. Comparison of MPEG 63654 collected in *várzea* at Fazenda São Raimundo (below) and a specimen (MPEG 63600) of Hauxwell's Thrush *Turdus hauxwelli* (above) collected at the same locality. Note the darker coloration of the dorsal surface and the contrast between the rectrices and uppertail-coverts on MPEG 63654 (© Museu Paraense Emílio Goeldi, Belém)

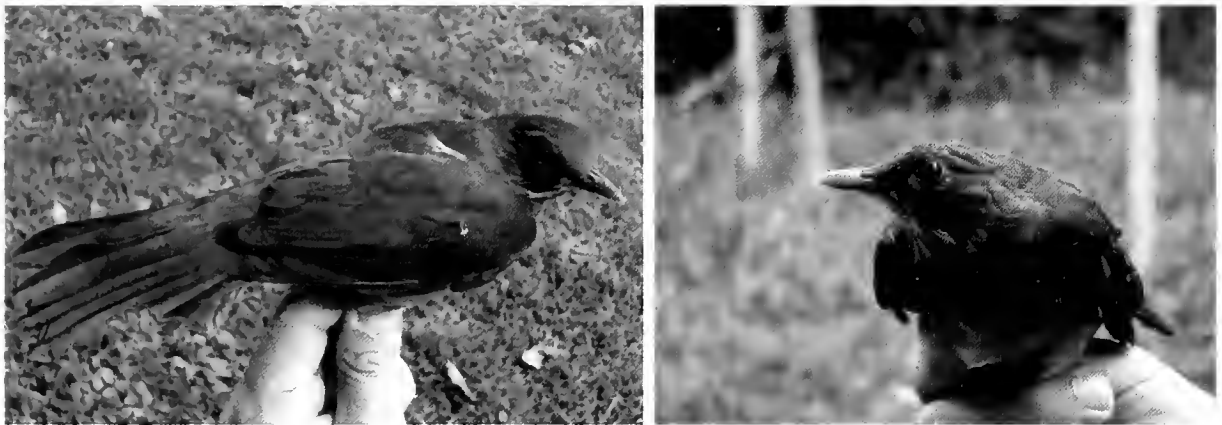


Figure 3. Várzea Thrush *Turdus sanchezorum*, Parque Zoobotânico, Rio Branco, Acre, Brazil, May 2010 (Edson Guilherme)

following preparation and cataloguing, it was compared with the series of *T. hauxwelli* at the Museu Paraense Emílio Goeldi (MPEG) in Belém, which includes specimens from Acre and elsewhere in Amazonia. The 2007 specimen proved to be more robust, with a yellowish-green bill and darker plumage, olive-brown dorsally, with dark outer rectrices contrasting markedly with the uppertail-coverts (Fig. 2), unlike the reddish-chestnut *T. hauxwelli* specimens from the same region (Fig. 2). It was therefore identified as the 'grey-tailed morph' from Peru (Guilherme 2009).

Capture of *T. sanchezorum* at PZ-UFAC permitted the tentative re-allocation of the specimen from Fazenda São Raimundo (MPEG 63654) to the same species, which was not possible at the time of its deposition in the Goeldi collection (2008) due to the lack of other specimens of this taxon for comparison. Although the general coloration of MPEG 63654 is similar to that of Várzea Thrush (Fig. 2), its orbital ring is the same colour as the plumage and the iris is red, whereas specimens of *T. sanchezorum* have a yellow / orange orbital ring and brown iris (O'Neill *et al.* 2011; Fig. 3). Given these inconsistencies in bare-part coloration, identification of MPEG 63654 should be treated with caution.

Confirmation of the presence of *T. sanchezorum* in Rio Branco (PZ-UFAC) and its possible presence elsewhere in the vicinity of this city, extend the species' known range c.400 km south of the nearest locality, Igarapé Castanha, on the rio Purus in the Brazilian state of Amazonas (Fig. 1), as reported by O'Neill *et al.* (2011). Its occurrence in Acre is not unexpected, however, given that the rio Acre is a right-bank tributary of the Purus, which rises in Peru and flows through Acre on its way north to discharge into the Amazon.

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A Northern Wheatear *Oenanthe oenanthe* in mainland western Mexico

by Jorge Nocedal & Federico Casillas

Received 1 December 2012

Two subspecies of Northern Wheatear *Oenanthe oenanthe* breed in North America: *O. o. oenanthe* in north-east Canada and Greenland, and *O. o. leucorhoa* on coasts of Alaska and far north-west Canada; both winter in sub-Saharan Africa, but follow different migration routes (Kren & Zoerb 1997). The species has the 'widest record of vagrancy of any passerine' (Collar 2005). Nevertheless, most records in North America away from the breeding grounds are from the Atlantic coast, with many fewer on the Pacific.

On 20 October 2012, at Ejido Ojo de Agua El Cazador, 70 km west of the city of Durango, western Mexico (23°53'54.00"N, 105°17'26.39"W), JN observed a unusual bird that flew off before it could be identified. However, his photographs (Fig. 1) confirmed the bird's identity as a Northern Wheatear in non-breeding plumage.

We are unable to explain how the bird reached the highlands of the Sierra Madre Occidental in southern Durango state, but it seems probable that it was displaced by Hurricane 'Paul', which moved north across the Mexican Pacific on 13–17 October, in conjunction with the first winter weather front from Canada (weather.unisys.com/: accessed October 2012).

In Mexico, there are two records (in October 2008 and 2009) from Baja California (Erikson *et al.* 2009) and Howell & Webb (1995) mentioned two records from the Yucatán Peninsula (in November 1973 and 1983). Elsewhere in the Neotropics, there are records from the West Indies, on the Bahamas, Barbados, Cuba, Puerto Rico (Buckley *et al.* 2009), as well as on Curaçao (November 1962) and Bonaire (December 1975) (Prins *et al.* 2009) and recently (*O. e. leucorhoa*) in continental South America, in French Guiana, in October 2006 (Renaudier & CHG 2010), as well as in Panama, in Chiriquí, in 2008 (Angehr & Dean 2010).



Figure 1. Non-breeding-plumaged Northern Wheatear *Oenanthe oenanthe*, Ejido Ojo de Agua El Cazador, Durango, Mexico, October 2012 (Jorge Nocedal)

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